



FRIDAY, JANUARY 9.

Contributions.

A German Railroad Accident.

FRANKFORT-ON-MAIN, Nov. 18, 1884.

TO THE EDITOR OF THE RAILROAD GAZETTE:

After the recent serious accident at Hanau, near here, on the Prussian State Railway, I was able to visit the scene the next day, while the wreck was practically *in statu quo*.

It was interesting, as showing how a comparatively harmless accident may become serious through complication of circumstances. It is also interesting as illustrating the working of European railroad rolling stock under such circumstances, and as emphasizing the imperative need of quick-acting stopping facilities; also as a warning about the position of distant signals.

The accident took place about noon on Friday, the 14th inst., the day being clear, in a place where the track is about level with the neighboring ground, with a view open all around for a long distance, except as cut off by cars standing in the Hanau yard, or by the overhead bridge to the eastward of the scene of the accident.

A freight train had arrived from the east, and apparently had not been able to find room to stand inside the distant signal. It was therefore left in the position shown, while its engine, having been cut off, was doing switching.

A passenger train carrying mainly fourth-class passengers

not find room inside. Furthermore, this signal should not have been so close to the overhead bridge where it first became visible that trains could not easily pull up before reaching it, with the available brake power.

The brake power in question was so woefully deficient that the drivers on such trains must feel that they carry their lives in their hands, subject to the slightest accident to permanent way or machinery.

It is clear that any one of three precautions would have averted this accident: First, if the distance signal had been placed far enough out to allow the "freight" to come inside, and visible at a proper distance to allow an easy stop, and consequently had been at "danger" after the "freight's" passage, instead of being open for its entrance; second, if the colliding "passenger" had had a steam brake on its heavy engine; and, third, if it had had rapid-acting reversing-gear and continuous brakes.

It seems as if the driver of the colliding train could not have looked very sharply at the track as he passed the overhead bridge, since the distance he had, 2,000 feet, should have been almost sufficient to bring up his train by the ordinary brakes and by reversing, if that process had been applied at once. Since, however, the signal stood at "clear," and as the actual surface of the rails was hidden from him by a slight rise in the ground, he may have thought, until too late, that the standing train was on the other line, and in any event cannot be much blamed with the brake facilities at his disposal.

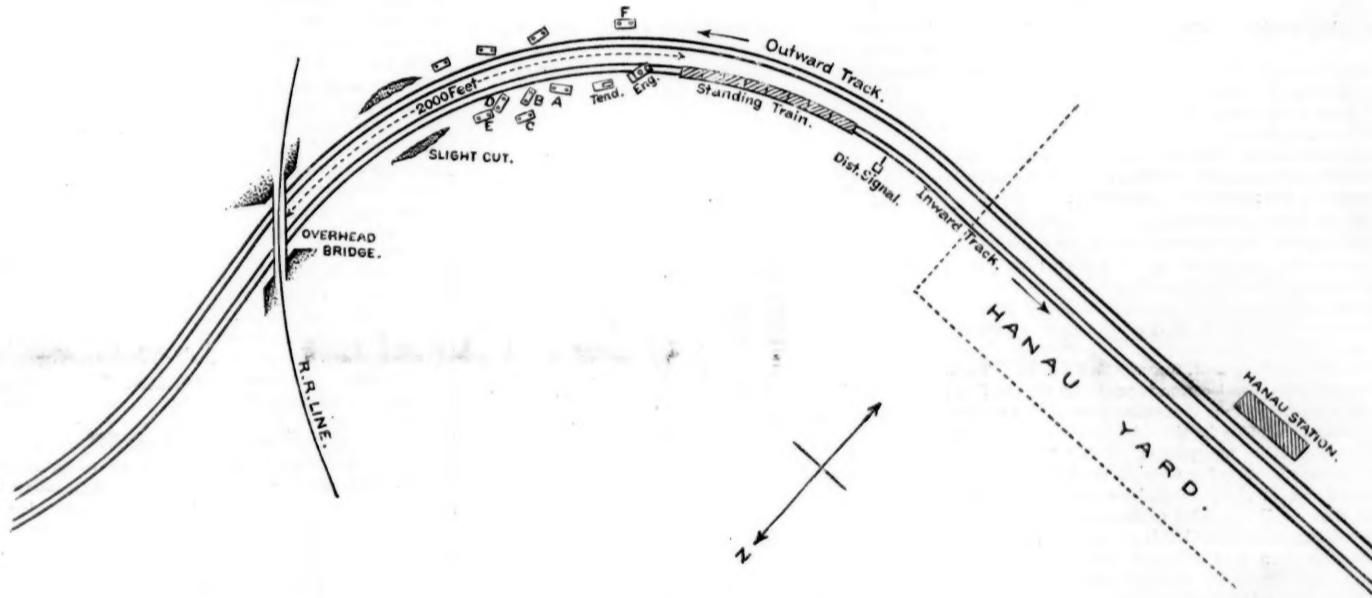
To show how entirely the loss of life was due to the innocent out-going mixed train, I will say that the driver and fireman of the colliding train remained on the engine and escaped without injury.

Furthermore, as if to prove the same, a passenger train ran into the rear of a "freight" in the same yard on the evening of the next day, owing to a misplaced switch,

directions, as if made of sheet iron; the 2-inch continuous draw-bar, for instance, having been rolled up into a turn and a half of a helix, with a diameter of about a foot.

I had not the facilities for finding out in what order the cars stood in the train, but it appeared as if they came in the order of the letters to *E*. The action then appears as follows: The right-hand buffer of the engine striking the car of salt, forced the head of the engine to the left. The tender received the shock centrally through the coupling link and foot-plate, it having no buffers, and moved as directed by the engine. The shock was by this action thrown upon the outer or left-hand buffer of the following car and the end of the car, and with it the tender was forced off the iron on the opposite side. The action then continued in the same zigzag fashion through the train, and, the couplings parting, car *C* fell inside the curve, and *D* (possibly *B* also) was let fly against the train on the other track, with the result of rolling over the cars shown on the outside, and of forcing *D* back upon *E* in the position shown.

To sum up, then, the effect of the collision was that the engine's inside cylinder was punched off by the inside buffer bar, and the outside one would have probably met the same fate if the shock had occurred on a straight track; while the engine in general, with its solid plate frame, remained practically unharmed. After that the side buffers produced a zigzag action, instead of letting the cars meet end to end with their powerful under-frames. This resulted in driving the outward-going cars into the other train, and as they could only exceptionally meet the opposed cars on the same level, the under-frames which overran the opposing ones sheared off the light timber superstructures and crushed and mangled the occupants. The destruction of the under-frame of car *F* was probably effected by the frame of the opposed car running under it and becoming entangled with its wheels and pedestals.



A GERMAN RAILROAD ACCIDENT.

—farmers and market people—had come on from the next station east, and ran into the rear of the standing freight train. Five cars were derailed, part of them going one way and part the other, just as the locomotive of a heavy outgoing mixed train had got past the scene of the accident, under full steam, as there is a considerable rise out of the Hanau yard, continuing past the overhead bridge. Those cars of the colliding train which went to the outside of the curve were therefore hurled into the passing train, and the latter, of course, drove them back with the full force due to the following cars, several of its own cars being at the same time ditched by the shock.

The outgoing train had few passengers, but the crowded passengers of the fourth-class vehicles of the colliding train suffered frightfully. Thirteen persons were killed at once, while six died within 36 hours, leaving 16 still in the hospital badly wounded, besides seven persons less severely wounded in private hands.

The colliding "passenger" had neither continuous brakes nor steam brake on the engine, and the reversing gear on the engine was operated by a screw only. The latter was in full forward gear when I saw it. It may or may not have been operated, but from part of the account of the engine-driver, which I overheard, it would appear that if he had any time after seeing the train in the way, he did not have his mind enough about him to have fully reversed the engine. The tender brake appeared to have been set.

The distance signal was, it is said, set at "track clear" for the "freight," which had not yet reported "in," and the fact that the operator at Hanau gave "line clear" to the next station under those circumstances has caused his arrest.

This was, of course, the primary cause of the accident, but it is evident that the train gang of the "freight" is not entirely free from responsibility in not having signals out to protect its rear when standing outside a distant signal, or else the rules are at fault for allowing such negligence.

If freight trains were kept out habitually for want of room, the management was at fault for allowing a distant signal to remain at such a distance from the yard that trains could

and tore up the track and destroyed several cars. There was no personal injury, however.

Coming now to the behavior of European rolling stock under such circumstances, the first thing that struck me on visiting the spot was the amount and nature of the injury to the engine and the damage it had done in receiving it. It had struck, apparently, a car of salt in bulk, for that material, or something very similar in appearance, lay heaped upon the ground in front of the engine, while the completely demoralized iron under-frames of that car and one or more besides were strewn about on the inside of the curve. The locomotive in causing this ruin had had its smoke-stack knocked off, smoke-box cover in front displaced but not seriously injured, the outer half of the inside cylinder (inside and outside refer to the curve) torn badly off, leaving a longitudinal section of the cylinder exposed. The outside cylinder seemed to have sustained some damage, but exactly how much was not apparent, as its jacket was still on, though a good deal banged up. With the addition of some bending of the safety-valves, this seemed to be about the extent of the injury suffered by the engine, which stood upright with the leading wheels and forward drivers (it was an outside-cylinder, 6-wheeled, 4-coupled machine) derailed outside, and the back drivers inside the curve. The tender stood inside the curve in line with the engine and still coupled on, considerably canted over, but standing on its wheels, of which the inside ones had sunk to the axles into the ballast. The baggage car and the first passenger car stood as shown at *A* and *B* in the sketch, considerably banged up, but retaining their original form. At *C* lay the under-frame and wheels of a car, and *D* and *E* were two cars in about the position shown, with their upper works all to pieces, and their under-frames in pretty bad condition. On the other side of the tracks, entirely clear of the outward one, which was cleared on the day of the accident and must have been but little encumbered or damaged, lay the wrecks of four cars, most of them with the upper works completely torn off, and the forward one at *F* completely mangled out of shape, and bent and broken in all

The result emphasizes the undesirability of side buffers with their diagonal strains, and while pointing somewhat to an advantage in plate frames for engines, seems to indicate a considerable gain in safety to passengers from the strength of our car bodies, primarily intended for the support of the load.

It may be of interest to note that when I arrived on the spot, 22 hours after the accident, the inward track was still, as I said before, about *in statu quo*. There were probably 15 to 20 men at work besides the force employed on the track, and the net result of their labors in the two hours I was there was to jack up the front end of the engine and leave it blocked up in such a way that it could not be pulled without tumbling the whole blocking down, while they had put re-railing irons under the forward drivers as if to pull with. Besides this, the force accomplished the splicing of two telegraph wires, pulled the wreck of the upper works of car *E* out of the way, and labored ineffectually to uncouple the engine and tender. When I revisited the spot two days later, I half expected to see at least the tender still there; but all the running gear and frames, except of two cars on the outside of the curve, had been removed, and both tracks were clear.

In this connection a case is worth mention of the substitution of an iron for a wooden bridge in Bohemia, an account of which I saw in a technical paper. It was spoken of as a novelty, and one was left to infer a good one. The new bridge was run on trucks over the span, and lowered with jacks into place, and the operation only suspended the traffic for 48 hours!

W. HOWARD WHITE.

Railroad Surveys and Topography.

TUSCALOOSA, Ala., Dec. 23, 1884.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The map of the Atlanta engineer, referred to in your issue of Nov. 5, if not valuable in itself, has brought out many valuable suggestions, with some to which I cannot subscribe.

In the discussion of practical questions it is easy to tell

the opinion which has been tested by actual work from mere conceit, and the man who has employed only one method, or used a method under exceptional conditions, cannot de-

fit as well as curves of fractional degrees), I put in detached curves conforming as nearly as possible to small penciled circles placed on contour lines at those points where the de-

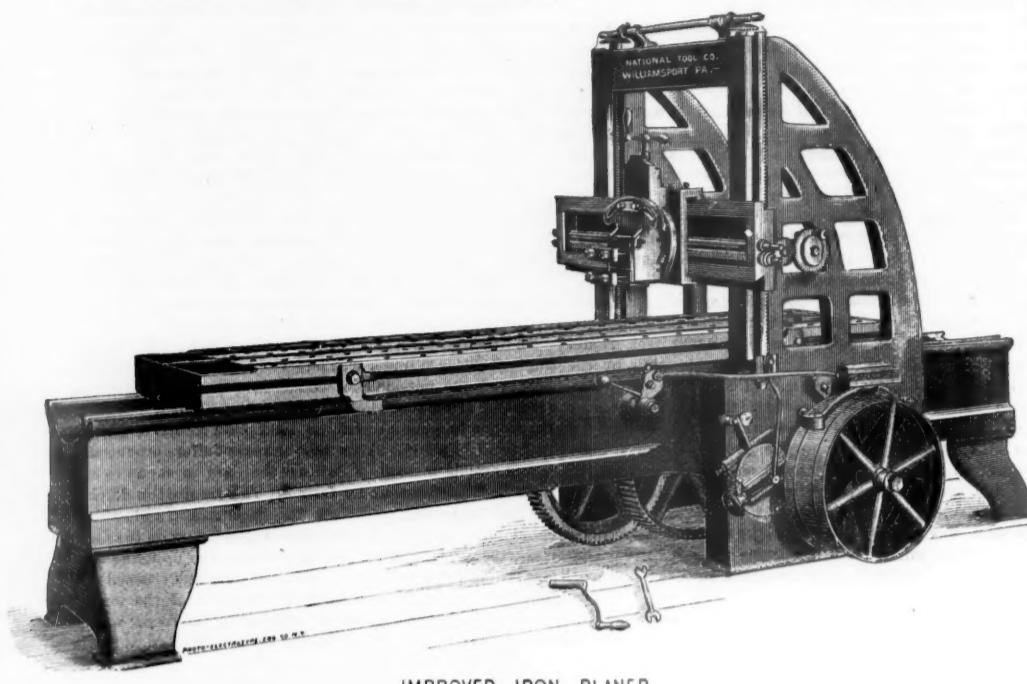
from which subtract calculated tangents of the curves to obtain distances from P. C. to P. T. Adding these distances to those around the curves gives the distance from the initial point to each P. C. and P. T. on a section of ten miles of location. After this analytical work it will be necessary to tie to your preliminary in order to check your position only one-tenth as often as if the notes of the projections had been obtained by graphical plotting alone. I do not run out the tangents in the field to an intersection.

I use a scale of $\frac{1}{4000}$ in most preliminary and location maps, and get in ten distinct contours (10 ft. difference in elevation) in each quarter inch, which would represent a slope of 45 degrees. For steeper slopes the contours may run together and the plans require special consideration and a larger scale. A 45 degree slope looks surprisingly steep when one gets 300 to 1,000 ft. high on it.

In conclusion, I will say that I have seen one of our "born engineers" with a party costing \$1,200 per month run a curve at the side of a mountain from within 300 ft. of the same starting point until he had consumed four weeks trying to get a tangible line on the mountain side, when a second curve projected on topography taken on the first line would have determined the line.

In mountains where it takes an entire day of hard and dangerous work to run 300 ft. of location it will not pay to depend much on memory and trial work.

R. E. HARDAWAY, C. E.



IMPROVED IRON PLANER.

side that other methods unknown to him should be condemned.

To speak of locating 5 to 8 miles per day seems marvelous, and can only refer to a wide, level plain, presenting no difficulties to bring it under the rules which govern the ordinary work of locating railroads.

I am myself a strong believer in the advantages of a proper preliminary map, with accurate contours, to be used on the ground by an expert locating engineer.

Some of your contributors speak as if the use of contours, or even of a map at all, indicated lack of practice and of intuitive knowledge of the features of the country; but many a practical engineer who can carry his grade lines and his traverse in his head on a reconnaissance, in ordinary ground, knows that it will not do to trust his memory in mountain work around spurs, while developing a sinuous line along the face of a rocky escarpment, for even half a mile. Others seem to suppose that the location is made by the chief of party by trial lines, and then the contours are placed on the map to be sent to the office for the chief engineer to project lines and locate revisions by equation. Either hypothesis is that of an engineer not familiar with the work of an expert in location who has carefully selected his line by reconnaissance, has then made a careful preliminary survey, and, having carefully cross-sectioned this preliminary, then projects his location from data obtained from accurate contours, which exhibit precisely the most economical position for the alignment of the final location. By this system nothing is left to chance, for an accurate topographical map will give all this information, as many a locating engineer has tested practically.

Now this system of location requires that the very best practical locating engineer is using this, the very best practical method. Doubtless, a poor engineer will make a poor location, whether he uses the method of a succession of trial lines or the method of definitive location by contours.

The cost of obtaining contours is much less than would be supposed by one not familiar with the present methods which the French engineers style tacheometry, or rapid measurement. This is accomplished by the use of stadia hairs instead of chaining, and by the use of the pocket altazimuth, which combines in one small accurate instrument the pocket compass, the hand-level and the slope measure, costing only \$50. An aneroid reading to single feet completes the outfit.

To explain the practical working of this system, I will give my plan of proceeding:

Having prepared a general map to a scale of 2 in. per mile (2,640 ft. per inch) and equipped with aneroid, altazimuth and stadia telescope to be used with portable rod, carried by an assistant, I make the necessary reconnaissance. With the reduced barometer elevations I determine the most eligible passes, and with the altazimuth the appropriate development of my line according to the assumed grade. I can then place my preliminary within 300 or 400 ft. of the final location; which being done, I cross-section the line by the use of the altazimuth at such intervals as the accidents of the ground require, extending usually 500 ft. to right and left. I obtain elevations on this portion accurate to within one foot, and sketch in topography for a further distance of 1,000 or 1,500 ft., indicating the limits of the accurate portion, so that others may not be misled.

I plot my preliminary line on paper by latitudes and departures to a scale of 400 ft. per inch, measuring the distance on the paper to each point of deflection from the corners of 2,000 ft. (= 5 in.) squares, into which the paper is first checked up by pencil or light ink lines. When the topography is on, I take a pair of dividers and beam compasses, and with radii of even degree curves (which nearly always

sized grades would cut them; then connect these detached curves by tangents, drawing the tangents to an intersection. The non-conformance of the tangents and the small grade

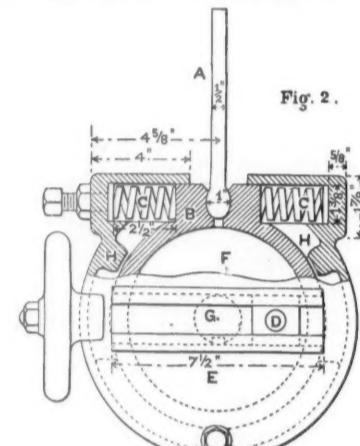


Fig. 3.

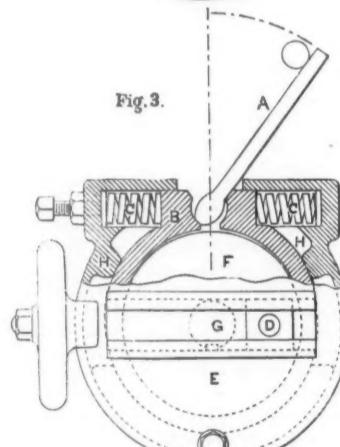
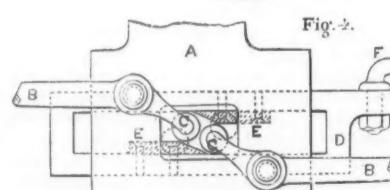


Fig. 2.



Details of Improved Iron Planer.

circles between the curves may make it necessary to revise the curves.

Then ascertain the co-ordinates or distances from the corners of the 5-in. squares to the tangent intersections, and with the formula

$$\frac{\text{departure}}{\text{latitude}} = \text{tang. of bearing},$$

obtain (analytically) the bearings of the tangents, from which get the angles of intersection. Then

$$\text{Secant of bearings} \times \text{latitudes} = \text{distances},$$

from which subtract calculated tangents of the curves to obtain distances from P. C. to P. T. Adding these distances to those around the curves gives the distance from the initial point to each P. C. and P. T. on a section of ten miles of location.

After this analytical work it will be necessary to tie to your preliminary in order to check your position only one-tenth as often as if the notes of the projections had been obtained by graphical plotting alone. I do not run out the tangents in the field to an intersection.

The small pinions are of steel. The weight of a machine to plane 36 in. by 36 in. by 10 ft. is 10,500 lbs.

Any further particulars can be obtained from the National Tool Co., Williamsport, Pa.

American Practice as to Nut-locks.

The tables presented herewith give a further installment of the information gathered from the responses to a circular sent out from this office some months since, inquiring as to current practice in a number of track details.

The desired information was obtained, as has been noted in previous abstracts, from nearly 91,000 miles out of 121,592 in operation in the United States, or about three-quarters of the total; but for various reasons an unusually large proportion of the companies responding to the circular were either unwilling or unable to give definite answers to the questions. "What nut-lock is in use?" and "In your judgment, what nut-lock is best?" Many companies responded simply that they were using "several" (without naming them), and that they were "undecided" as to comparative merits, as no doubt many other companies might have done with perfect truth. All such ambiguous or doubtful mileage (about 18,000 miles) has been dropped altogether from the reports, leaving only 72,376 miles represented.

It is but just to the various devices represented, moreover, to say that attention should be particularly called to the fact that, even after every effort to preserve fairness has been made, the indications of such statistics ought, in any case to be accepted with many grains of allowance. The question involved is not a simple one, in which only two courses are possible, and which does not change with time, like that of laying track with broken or even joints, or (in less degree) the dimensions and woods of cross-ties. The number of possible nut-locks is almost infinite, and priority of introduction alone gives an immense advantage to those of earlier introduction, like the Verona, Pratt, etc., as compared with other forms, even should they be of greater merit, which have only recently been put upon the market. Moreover, some even of the older firms which have fallen behind may have done so from some single defect which has been or will be corrected. A prominent instance of this, which it is but fair to mention particularly, is the vulcanized fibre washer. The washer now in the market under that name is not the one to which the statistics presented in the table herewith refer. The original form of this nut-lock has recently been modified by encasing the vulcanized fibre proper in a malleable iron rim or washer, as shown in the engraving herewith, so as to remedy what were found to be serious defects in the older form, tearing apart when screwing up the nut and injury to the edges from exposure to the weather.

In preparing the tabular abstracts it was found difficult to preserve perfect fairness, nor is it probable that this has been fully attained. The various forms of response and the manner of tabulating them were as follows:

1. Responses stating simply that a certain single nut-lock was used and preferred; tabulated accordingly.

2. Responses stating that one nut-lock was used and another preferred; credited to the one *preferred*, and not to the one actually in use.

3. Responses stating that such and such nut-locks were in use, but expressing no preference; credited to those in use as "apparently" preferred, the inference being that the nut-lock was used because believed to be the best, although not so stated.

In the numerous cases where two nut-locks were quoted on a par with each other, $\frac{1}{2}$ the company, with half its mileage, was credited to each. In the few instances where three or more were thus mentioned, $\frac{1}{3}$ was still credited to each in the column for number of companies (to avoid troublesome fractions); but the mileage was divided up in equal proportions. By so doing the aggregate of mileage was preserved correct, but the apparent number of companies was increased by one or two.

In many cases, where one report was received covering a whole system and others covering only a part of the same system, the two not agreeing in respect to nut-locks, both have been given, the mileage covered by the minor report being deducted from the complete report. This has been done as a matter of fairness, since the choice of a nut-lock is so much a matter of individual opinion and is so carefully observed by minor officers. In tabulating the statistics of joints and cross-ties this course was not pursued, but the responses from the higher officers only were considered (with slight exceptions) when any conflict was found to exist.

Thus it will be seen that the tabular statistics do not pretend to give, nor pay any attention to giving, the mileage of track actually equipped with the various nut-locks, but simply give the number of officials favoring each with the aggregate mileage which they control. The latter may, in a rude way, represent the relative mileage in use, but it can only be rudely and with important errors, probably, in respect to some of the nut-locks.

The various nut-locks shown in the table, which includes only those which some one line at least gives a preference to, are as follows:

1. Verona.—A tempered steel ring cut obliquely at one point, as shown in the full size illustration herewith. Press



Verona Nut-lock.

ure brings the ring nearly flat but leaves always the cutting edges projecting beyond the plane of the washer, so that the nut does not have an even bearing all around. The weight

NUMBER AND MILEAGE OF RAILROADS PREFERING VARIOUS NUT-LOCKS.
(Determined in the manner elsewhere explained, to which reference should be made before accepting the indications of the table.)

NAME OF NUT-LOCK.	Gives preference to the given nut-lock as better than, or as good as, any other.								Gives preference to some other nut-lock, having both in use.	
	North and East.		South.		Northwestern and Pacific.		Total, United States.			
	Cos.	Miles.	Cos.	Miles.	Cos.	Miles.	Cos.	Miles.		
Verona.....	51	19,414	29%	10,965	10	13,018	90%	43,337	11	5,426
Pratt.....	6	3,575	1	2,168	3	5,207	10	10,950	4	6,01
Wood and iron.....	3	1,080	6	4,604			9	6,284	3	709
Vulcanized fibre.....	5	1,836	3%	128	1%	551	9	2,515	6	6,925
Harvey grip nut.....	2	206	1	5 0	1	368	4	1,134	2	110
Auto wood nut.....	2	440					2	440		
Van Kuran.....	1	622					1	622	1	3,869
Van Dusen.....	1	476		1	750		1	476		
Howe plate washers.....		275					1	275		
Mercer.....	36	361					1	361		
Cambria.....	1	94	1	196			2	290	1	418
Iron City.....	1	326					2	326		
Ruffner, Dunn & Co.....	2	1,887					1	1,887		
Smith.....	1	35					2	35	1	161
Adams Western.....	36	205		110			1	110		
Fisher joint.....	2	1,643			1	736	5%	2,379		
White lead on thread.....										
Good bolts and watchfulness.....										
Total.....	83	33,075	43	19,421	17	19,880	143	72,376		

This table omits altogether the responses from about 18,000 miles of road, which were so contradictory or non-committal that they could not fairly be counted, or which declare no confidence in any nut-lock, or which left blank the question referring to them.

is something under 1 oz. each. The details of the vote for this nut-lock were as follows:

	North and East.	South.	Northwest and Pacific.	Total.
Use and prefer Verona.....	29	7,063	14	3,795
Do; apparently.....	10	4,926	5	1,492
Use several, prefer Verona.....	7	3,534	7	3,293
Do; like another equally well.....	6	2,849	3	1,752
Use nothing; prefer Verona.....	2	442	2	600
Total, appearing to prefer Verona.....	51	19,414	39	10,905
Use Verona with others and prefer another.....	6	2,611	2	2,181
			3	1,234
Total, as above.....	51	19,414	39	10,905
Use and prefer Pratt.....	29	1,575		
Do; apparently.....	2	513		
Use several, prefer Pratt.....	1	750		
Do; like another equally well.....	1	417		
Use nothing; prefer Pratt.....	1	622		
Total, as above.....	51	19,414	39	10,905
Use Pratt with others and prefer another.....	6	2,611	2	2,181
			3	1,234
Total, as above.....	51	19,414	39	10,905

2. Pratt.—A rubber washer inclosed within a malleable iron case so as completely to protect its exterior. The nut-



Pratt Nut-lock.

lock complete weighs in some of its forms about 8 oz.; others considerably less. The details of the vote were as follows:

	North and East.	South.	N. W. and Pacific.	Total.
Use and prefer Pratt.....	2	308	1	2,168
Do; apparently.....	2	870	1	2,000
Use several, prefer Pratt.....	1	27	1	516
Do; like another equally well.....	2	3,370	2	2,691
Total, appearing to prefer Pratt.....	6	3,575	1	2,168
Use Pratt with others and prefer another.....	3	2,222	1	3,869
Total, as above.....	6	6,001	1	6,001

Summary of those using Pratt with others and preferring another nut-lock:

Preferring Verona.....

Preferring Vulcanized fibre.....

Preferring Verona or vulc. fibre.....

Total, as above.....

Summary of those using Verona with others and preferring another nut-lock:

Preferring Pratt.....

Preferring Vulcanized fibre.....

Preferring Verona or vulc. fibre.....

Total, as above.....

Summary of those using Vulcanized fibre with others and preferring another nut-lock:

Preferring Verona.....

Preferring Van Kuran.....

Preferring tight nut.....

Total, as above.....

Summary of those preferring another nut-lock:

Preferring Verona.....

Preferring Van Kuran.....

Preferring tight nut.....

Total, as above.....

Summary of those preferring another nut-lock equally well:

Preferring Verona.....

Preferring Van Kuran.....

Preferring tight nut.....

Total, as above.....

to 5 cents per joint, including extra cost of bolt. The details of the vote were as follows:

	North and East.	South.	N. W. and Pacific.	Total.
	Cos.	Miles.	Cos.	Miles.
Use and prefer wood.....		2	741	
Do; apparently.....	1	968	3	2,432
Use several, prefer wood.....	2	712	1	1,431
Total, appearing to prefer wood.....	3	1,680	6	4,604
Use wood with other nutlocks and prefer another.....	2	509	1	200
				3
Total, as above.....	5	2,595	1	3,430

Of those using wood with other nutlocks and preferring another, two companies, 233 miles, prefer the Verona, and one company, 476 miles, the Van Dusen.

Vulcanized Fibre.—A washer formed of a hard leather-like substance, made by treating vegetable fibre with acids.



"Iron-Clad" Vulcanized Fibre Nut-lock.

A new form of this nutlock, known as the "iron-clad" fibre washer, as shown in the cut herewith, has recently been introduced as above noted, and was described in the *Railroad Gazette* for Oct. 3, 1884. It protects the nutlock proper by a malleable iron ring of an L section. The new form weighs about 1.1 oz. each. The details of the vote in favor of the old form of nutlock, not having this protecting ring, were as follows:

	North and East.	South.	N. W. and Pacific.	Total.
	Cos.	Miles.	Cos.	Miles.
Use and prefer fibre.....	1	134	1	72
Do; apparently.....	1	218	1	427
Use several, prefer fibre.....	2	330		
Use, like another equally well*....	2	1,104	2	56
Total, appearing to prefer fibre.....	5	1,836	1%	128
Use fibre with others and prefer another.....	5	2,395	1	891
			1	3,430
Total, as above.....	6	6,025		6,025

Summary of those preferring another nut-lock:

Preferring Verona.....

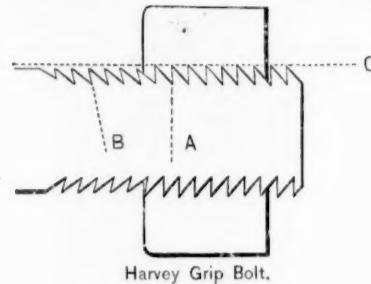
Preferring Van Kuran.....

Preferring tight nut.....

Total, as above.....

Summary of those preferring another nut-lock equally well (four companies with 2,548 miles of line) specify the Verona.

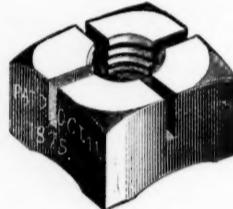
Harvey Grip Bolt.—A device different in kind from any of the others here presented, which consists in cutting a thread of different form, but the same pitch, on the bolt and nut, as shown (with some little exaggeration) in the engraving.



Harvey Grip Bolt.

ing. Applying nuts with a thread like *A* to bolts with a thread like *B* causes a distortion of both threads, producing an approximately fixed amount of friction (so long as the elasticity of the metal is not destroyed), which can be varied at will by changing the form of the threads.

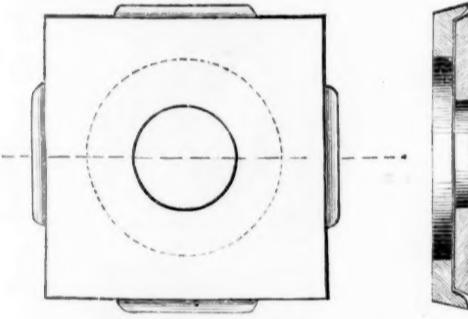
Atwood.—A device, several modified forms of which exist, but in substance a common nut slightly concave at its base, with two deep slots at right angles to each other, extending entirely across the nut. Screwing the nut home produces pressure on its outside edges, causing the nut to spring so as



Atwood Lock Nut.

to give a tight grip on the bolt. The Boston & Albany Railroad uses and prefers this nut-lock. One other New England line, the St. Johnsbury & Lake Champlain, reports 40 miles in use, and apparently prefers it, since it is the only one it uses.

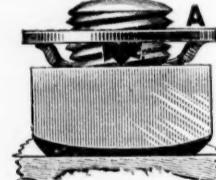
Van Kuran.—A nut-lock composed of a lower plate with a large hole in it over which a spring plate is placed, the



Van Kuran Nut-lock.

two being held together by clips in the lower plate. The spring of the upper plate is designed and claimed to be able to throw any desired strain on the bolt when the nut is screwed home.

Van Dusen.—A thin ring of metal having toothed lugs stamped out of it, bent in such manner as to be readily inserted over the screw-thread after the nut is screwed home. On striking it a blow with a hammer (transmitted by a ring serving as a set or swage-block), the toothed clogs are flat-



Van Dusen Nut-lock.

tened out and engage with the threads of the bolt. It was more fully illustrated in the *Railroad Gazette* for July 25, 1884.

Mr. J. H. Pearson, Engineer and Superintendent of Road Department, Louisville, New Albany & Chicago Railway, says: "I consider the Van Dusen lock the only sensible lock I have seen. It is applied to the part of the bolt it should be and locks both bolt and nut together."

Howe Plate Washer.—A device belonging to the general class of the Verona recently introduced by Mr. M. G. Howe, Chief Engineer of the Houston & Texas Central Railway, and now in use, so far as we are informed, only on that road, which uses a slightly warped steel-plate washer, extending over two bolts. The device was more fully described in the *Railroad Gazette* for Aug. 1, 1884. The plate is cut through obliquely at each bolt-hole, so as to produce a

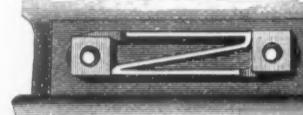
cutting edge, and the spring of the warped plate ($\frac{1}{4}$ in. \times $1\frac{1}{2}$ in. \times $6\frac{1}{2}$ in.) is relied on to keep a proper tension on the bolt, if it becomes loose by wear or otherwise, while the cutting edge restrains the nut from turning.

A test of one of these washers was recently made by Rieble Bros., of Philadelphia, in which pressure was communicated to the washer by $\frac{3}{4}$ -in. nuts, the same as if it were on a rail joint. The set of the washer at diagonal corners before testing was 0.15 in. at each corner. The strain required to produce a set of the washer at different distances from the diagonal corners were:

3 $\frac{1}{2}$ in. off each corner	200 lbs.
3 $\frac{1}{2}$ " "	1,300 "
1-16 " "	4,270 "
1-32 " "	6,000 "
Flat all across from end to end	11,400 "

After the strain was removed a permanent set of 0.08 in. was observed on one corner, the full elevation being 0.27 in., instead of the 0.30 in. of full elevation, another corner being depressed. A previous test gave slightly less strains, but the difference was not essential.

Mercer.—A Z-shaped bar flattened out at each end to serve as a washer for the two nuts. In screwing the nut



Mercer Nut-Lock.

home this Z is distorted so as to permit it to turn, but springs back into place so as to prevent it turning backward.

Cambria.—In substance, a long bevelled wrought-iron bar or wedge, which fits in between the nut and the fish-plate and is turned up against the former like a clinch-nail after screwing it home. This form of nut-lock was illustrated in the *Railroad Gazette* for Aug. 23, 1878. It requires in the form there shown a fish-plate rolled with a slight groove especially for it. If modified since the modification is unknown to us.

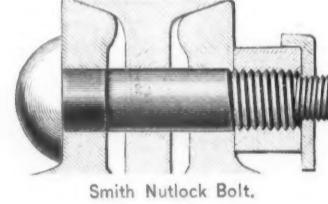
Iron City.—A nut-lock of recent introduction which consists essentially of a wire bent at each end so as to form



Iron City Nut-lock.

a washer for a nut, which carries hanging upon it a slightly shaped plate extending from one nut to the other so formed as to permit the nut to turn freely in screwing up, but resist its turning backward.

Smith. (Sometimes also called the *Kinney*).—A nut-lock of recent introduction which has a short thread of small diameter turning in the reverse direction to the main



Smith Nutlock Bolt.

thread of the bolt. After screwing the main nut home a thin plate serving as the nut-lock is screwed home on the smaller thread to a bearing against it and turned over upon it with a hammer, forming an absolute lock against the inner nut turning until the grip of the nut-lock on the nut is released. It was more fully described in the *Railroad Gazette* for May 2, 1884.

Fisher Joint.—Although not properly a nut-lock, this joint may be included among them, since the form of U-bolt

nut-lock." Several of the reports speak especially of the good working of the device as respects nuts staying tight.

Ruffner, Dunn & Co.—A nutlock made of a square bar (about $\frac{1}{4}$ in. square) of spring steel, bent into an S-like form and serving for two bolts. It operates on much the same general principle as the Verona. We are unable to present an engraving.

Adams Western.—No description or engraving of this nut-lock has been received.

One road reports that it uses "a diamond point chisel to raise a chip against the nut to hold it from turning back. The expense is $\frac{1}{2}$ cent per joint."

In Canada the only nut-lock mentioned is the Verona, but our reports from that section are exceptionally incomplete, and there appears to be a large mileage using no nut-lock whatever.

In England most of the roads use no nut-lock. The only one favorably mentioned is the Ibbotson, as to the precise nature of which we are not informed, which is in use on two lines, aggregating 1,849 miles, against 4,074 miles using no nutlock whatever. The Metropolitan Railway uses a "square nut with one joggle to bite into fish-plate."

In Germany an "elastic steel ring," whether cut open and provided with cutting edges or not we are not informed, seems at present to be most generally approved. Check nuts are also in limited use."

Transportation in Congress.

In the Senate on the 6th:

It was decided to resume consideration of the Oregon Central land grant forfeiture bill.

Mr. Morgan moved to amend by adding to the bill the substance of the provisions which on his motion had been added to the Atlantic & Pacific forfeiture bill, providing a method of judicial procedure for the ascertainment of the rights of any parties claiming under the grant.

After some debate, the amendment of Mr. Morgan was brought to a vote and was rejected—yeas, 15; nays, 28. The bill was then read a third time and passed without division.

Before the announcement of the vote on his amendment, Mr. Morgan changed his vote from *yea* to *nay*, and on the passage of the bill gave immediate notice of a motion to reconsider.

In the House on the 7th:

Consideration of the Interstate Commerce Bill was resumed, the pending motion being one submitted by Mr. O'Neill (Pa.), to strike out the section prohibiting railroads from charging more for a short than a long haul. Mr. Townsend (Ill.) inquired of Mr. Reagan (Tex.) as to the time which would be occupied in the further consideration of the bill; but Mr. Reagan not hearing the question, Mr. O'Neill volunteered the information that it would consume at least three weeks longer.

Mr. O'Neill then spoke in support of his motion. He could not see how it was possible to oblige the railroad to carry out the idea contained in the section.

It was the experience of men interested in railroad affairs that it would be impossible to restrict companies in the arrangement of how they should carry freight on long and short hauls, and an attempt to do so would be inimical to the business interests of the country.

Mr. Horr (Mich.) supported the motion. The section contained a principle which would do more to render this bill absolutely nugatory and injurious than all the other provisions of the measure combined. If gentlemen were governed by business principles, this section would not get twenty votes, and if it were retained it would be retained entirely as a matter of political claptrap.

Mr. O'Neill's motion was lost; yeas, 90; nays, 127.

Mr. Everhart (Pa.) offered an amendment excepting from the provisions of the section any railroad company in competition with waterway lines of transportation running literally in the same direction. Lost.

Electric Motors for the Elevated Railroad.

The following report on this subject is extracted in a somewhat condensed form from the *Engineering and Mining Journal*:

Prof. Moses G. Farmer has furnished to Mr. Cyrus W. Field an estimate of the cost of operating the Second Avenue Elevated Railroad of this city by electric motors, as compared with locomotives.

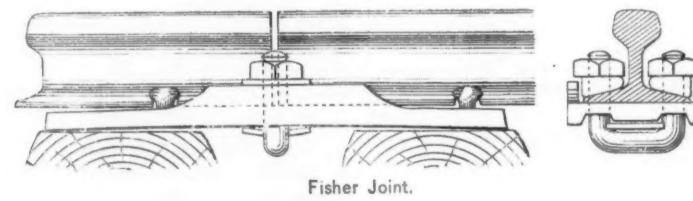
The estimate is based on the following assumptions:

A stationary plant can be erected near the middle of the line, consisting of one or more stationary steam-engines of the best type, capable of developing one horse-power by the combustion of $1\frac{1}{4}$ lbs. of coal per hour per horse-power, the coal costing \$2.50 per ton of 2,240 lbs.

Each of the 20 locomotives in use on this line at the busiest part of the day indicates 110 horse-power, with a consumption of 5 lbs. of coal per hour per 1 H. P., the coal costing \$4 per ton of 2,240 lbs.

The present steel rails weigh 70 lbs. per yard, and a similar central rail will be laid to convey the electric current.

One mile of central rail will offer about $\frac{1}{20}$ of an ohm's re-



Fisher Joint.

sistance, and the aggregate internal resistance of the dynamos concerned in producing the current will not exceed $\frac{1}{200}$ of an ohm.

Sufficient current will be supplied from the central stations to both tracks to energize at the same instant all of the 20 electric locomotives, no matter on what part of the tracks these motors may be situated.

One horse-power is the equivalent of 746 ampère volts, and 20 by 110 by 746 = 1,641,200 ampère volts in the aggregate will reach these motors.

The dynamos can convert 90 per cent. of the mechanical power applied to them into current electricity, and electric

motors can convert 90 per cent. of the electricity that they receive into power used to draw the trains.

The Second Avenue Railroad is $6\frac{1}{2}$ miles long.

The following table is calculated on the above assumptions:

	No. volts.	
Indicated horse-power.....	500	1,000
Locomotive.....	2,200	2,200
Electric.....	3,369	2,879
Pounds coal consumed per hour:		2,757
Locomotive.....	11,000	11,000
Electric.....	5,895	5,039
Saving by electricity.....	5,905	5,961
Cost of fuel per hour:		6,175
Locomotive.....	\$19.65	\$19.65
Electric.....	6.58	5.62
Saving.....	\$13.07	\$14.03
		\$14.27

This indicates that the lower and safer electro-motive force of 500 volts is only about 9 per cent. more expensive than 2,000 volts, and about 7 per cent. more expensive than 1,000 volts.

TECHNICAL.

Locomotive Building.

The Taunton Locomotive Works in Taunton, Mass., last week completed a heavy passenger engine for the Old Colony road.

The Rhode Island Locomotive Works in Providence, are building 10 passenger and 3 shifting engines for a Western road, and also a large locomotive for the Locomotive Improvement Co., of Toledo, O.

Car Notes.

The New York, New Haven & Hartford shops in New Haven, Conn., are building four combination baggage cars for the road.

McKee, Fuller & Co., at Fullerton, Pa., have recently taken orders for cars which will keep the works busy for some time.

The car-wheel works of Russell & Co., St. Thomas, Canada, which have been in operation for 13 years, have been reorganized as the St. Thomas Car Wheel Co. The works have been rebuilt and their capacity has been doubled by the new management.—*National Car-Builder*.

The Naugatuck Railroad shops in Bridgeport, Conn., recently completed a new passenger car for the road.

The Delaware & Hudson Canal Co. has recently ordered 100 sets of Moore's freight car door hanger. This will make 140 sets in use on that company's cars. Those in use have worked very satisfactorily.

Bridge Notes.

The Keystone Bridge Co. has started up its works in Pittsburgh again, a compromise having been made with the workmen on the reduction of wages.

The works of R. F. Hawkins & Co., in Springfield, Mass., last season turned out about 800 tons of bridge-work. The plant has been increased by several new tools.

H. S. Hopkins & Co., bridge-builders in St. Louis, have made an assignment. It is understood that their embarrassment is only temporary, and that the assets will meet all liabilities and enable them to resume before long.

The Canadian Pacific bridge over the St. Lawrence at Lachine will consist of 12 spans, eight of which will be 270 and the remaining four 408 ft. each. The greater part of the bridge will consist of deck trusses, with the exception of the channel spans, which will be built with lattice sides, thereby giving a view of the celebrated rapids which begin at the side of the bridge. The foundation is solid rock. The cost will not exceed \$2,500,000. The report that the contract has been given to a New York firm is denied by Manager Van Horne, who says tenders have not yet been called.

Iron Notes.

The usual number of suspensions of mills over the holidays are announced. Most iron mills stop for a week or two about this time to take stock and make repairs, but in the present condition of trade these suspensions have attracted considerable attention, and in some quarters have been commented upon as though they were special features of the present year.

The rolling mill of Zug & Co. in Pittsburgh has started up again in all departments.

Work was resumed Jan. 5 at the North Chicago Rolling Mill Company's mill at Bay View, Wis., at an average reduction in wages of 12 per cent. The reduction affects about 500 men, who are outside the Amalgamated Association.

The Joliet Steel Co. at Joliet, Ill., has taken a contract to supply 2,500 tons of steel rails for the Memphis, Selma & Brunswick road.

The New Albany (Ind.) Rolling Mill is running full time, chiefly on merchant bar.

Manufacturing and Business Notes.

The business of Charles W. Pickering & Co. has been transferred to the Pickering Spring Co., limited. The new concern, of which Mr. Charles W. Pickering is Chairman, and Frank S. Layng (formerly with A. French & Co.) Secretary and Treasurer, will continue the manufacture of railroad springs at the works in Philadelphia, and will be prepared to fill all orders promptly. Mr. Kearn (formerly with French & Co.) will represent the company at the South.

The Union Switch & Signal Co., in Pittsburgh, has temporarily reduced its working force.

Exhibits at New Orleans.

The A. French Spring Co. has a fine exhibit occupying a space of 72 ft. by 20 ft., and containing a great variety of car springs, and a well-executed model of the works at Pittsburgh, Pa.

The Baltimore & Ohio Railroad exhibits models of the "Grasshopper" and other early locomotives. Models of sail cars, windmill cars, early passenger cars, a section of old track, etc., are also exhibited.

American Iron Trade in 1884.

The *Bulletin* of the American Iron and Steel Association for Jan. 7 says: "In the United States the demand for all leading articles of iron and steel was less in 1884 than in 1883. We made less pig iron and bar iron, fewer steel rails, less steel for miscellaneous purposes, and fewer kegs of nails. The cause of this decline in demand have been so often referred to that we do not need to repeat them. Prices fell as the demand receded, and only in steel rails has there been any recovery from the lowest prices of the year, and even here the recovery has been but slight. Steel rails commenced the year at \$34 and fell to \$26.50 in September, since which time they have rallied to \$28 in December. No. 1 anthracite foundry pig iron at Philadelphia brought \$20.50 at the beginning of the year, and only \$18 at its close. Best bar iron at Philadelphia sold at two cents per pound in January, but it has for many months sold at 1.8 cents per pound, or \$40.32 per gross ton. This is a lower price than we quoted during the panic years, except for a short time in 1879. The store price of cut nails at Philadelphia was \$2.60 per keg in Janu-

ary, from which there was steady decline to \$2.10 in October, which is the present price. The price during the panic years did not fall so low until March, 1879, but from this low price there was a speedy recovery.

"Taking it all in all the year 1884 was a bad year for the American iron trade, rendering necessary a general reduction of wages and the closing of many manufacturing establishments. The new year opens with no promise of immediate improvement. If the farmers of the West could dispose of their wheat and corn and other staples at higher prices than now prevail we might soon see an increased demand and better prices for iron and steel, but until the farmers' prospects improve we cannot see better days for our iron and steel manufacturers nor for some other manufacturers. The country at large cannot be prosperous if the farmers are not."

The Pittsburgh Iron Trade.

The Pittsburgh *Chronicle-Telegraph* says: "Though the was a shut-down of the mills in the summer of 1883 of nearly 16 weeks while the conference committees were arranging the scales of wages, yet that year was considerably in excess of 1884 in the output of iron and steel in this city. "Skelp iron and wrought-iron pipe unquestionably led the production in this city throughout the whole year, for which business is indebted to natural gas. There are some articles of iron manufacture which have been very slack or left entirely which will be brought back as soon as the profit margin shows sufficient inducement. It was the wiser course to let them go for a time rather than encourage abnormally low rates by continuing to make them. If there are to be iron manufactures ruined by inadequate prices, Pittsburgh prefers they should be the manufacturers of other districts. Some grades have been retained, though the figures have been very unsatisfactory, and these will now most probably begin to pick up."

"The reductions of wages which were made so largely in the last half of 1884, will enable mills to enter the new year with more confidence, but the future will depend largely on whether the demand will admit of better prices. The higher paid workmen are not and cannot be reached before June. Should demand increase, and the long expected, or long deferred revival come in early and continue in a healthy way, more likely there will be efforts of the workmen already reduced to regain lost ground than of employers to carry the cut further into the ranks."

"In the last six months there has been improvement in light grades, such as band, hinge, hoop and lock iron, including the various shape grades, though as they fell off largely in the first half of the year, there has been plenty of room for them to pick up. Structural shapes enter the new year with a demand for about 200 tons day, two-thirds of which is produced at one mill. This class has kept up well, and may be regarded as in fair demand."

"The holiday shut-downs are not so extended as it was expected they would be, which is a hopeful sign in these times when most any sort of a straw is grasped at with many thanks for its assistance. The mills that run more than 300 days in 1884, with puddlers on double turns, were those of Carnegie Bros. & Co., Wilson, Walker & Co., Jones & Laughlin, Republic Iron Works, Wm. Clark & Co., A. M. Byers & Co., Graff, Bennett & Co.'s Millvale mill and the Pittsburgh Forge & Iron Co.'s plant. Some others in which the puddlers are now on double turn, but earlier in the year there was a great deal of loss of time, and at intervals some were on six heats. These include Spang, Chalfant & Co., Phillips, Nimick & Co., the Fort Pitt and the Clinton mills of Graff, Bennett & Co., Chess, Cook & Co., H. Lloyd Sons & Co., Pennsylvania Forge, the Keystone, Moorhead, McCleane & Co., the Elba Iron & Bolt Works. One of the largest mills in the city are the works of J. Painter & Sons, which was on double turn all along, until Jan. 15, 1884. Since there have been two long stops, the daily capacity for muck iron is about 140 tons, but not over 100 are now made. The annual finished capacity is 33,000 net tons, but in the year just ended it did not reach much over 18,000; but business has been better in the last three months than during the summer. Lindsay & McCutcheon have been manufacturing and selling 20 tons a day more of light grades in the last three months than in the third quarter. At Brown & Co.'s and Shoenerger & Co.'s business has been dull. At Oliver Brothers & Phillips' three mills from October, 1883, to August, 1884, puddlers were not on more than half time, but since August double turn has been the rule and the output 200 tons a day. It is expected that one of their mills will be reduced to six heats soon, as a large order for plates, which has been in course of filling for some time, and which has been furnished at the rate of 35 tons daily, is near completion. The average daily output of the mills for the year was about 1,300 tons, of which about 100 tons were steel other than Bessemer."

THE SCRAP HEAP.

Train Robbers.

The train robber has come east, and two of the tribe on the afternoon of Jan. 2 boarded a train on the Baltimore Central road, near Rising Sun, Md., and by threats of violence compelled the few passengers to surrender their money, watches and other valuables. The men then jumped from the train, which was running at full speed, and were supposed to be fatally injured. They were not hurt, however, but were followed up and captured the same evening.

Burning a Tunnel.

A Columbus, O., dispatch of Jan. 2 says: "A mob fired the Bristol Tunnel on the Shawnee Division of the Baltimore & Ohio road early this morning, and nearly 300 feet have caved in, necessitating a transfer of passengers. The guard were run out by the mob, and it is thought dynamite was used. The loss to the company will reach thousands of dollars. James O'Donnell was arrested at Newark while arranging for the transportation of arms to those engaged in firing and destroying the property."

The affair probably was a result of the Hocking Valley miners' strike. A later dispatch says that the timbering of the tunnel is completely burned out, and that it will be difficult to put out the fire, as the tunnel cuts through a vein of coal, which is burning.

Badly Cut Up.

"Smith met with a lamentable accident yesterday."

"How was that?"

"He was on his way to call on his girl when the train ran off the track and capsized."

"Too bad! He must have been dreadfully cut up about it."

"Cut up? Well, I should say he was! They couldn't find one of his legs at all!"—Graphic.

Fast Time to Mexico.

The Baldwin Locomotive Works finished four heavy locomotives for Mexico, and shipped them from Philadelphia Dec. 15. The shipment, with accompanying extras, etc., aggregated 12 car loads. The consignees had previously contracted for their transportation by the Blue Line, via Philadelphia & Reading Railroad from Philadelphia, the Atchison, Topeka & Santa Fe Railway from Kansas City, and

the Mexican Central Railway from El Paso to city of Mexico. The 12 cars were run as a special train all the way through. Leaving Philadelphia on the night of Dec. 15, they reached El Paso Dec. 28, and the city of Mexico Jan. 1.

A Woman Train Wrecker.

A dispatch from Grafton, W. Va., Jan. 4, says: "Ever since the fiendish wreckage of the St. Louis express near this place last Wednesday night, officers have been searching for the guilty persons, and to-day their efforts were rewarded by the arrest of Mrs. M. Beck, who has admitted the crime. Her husband was arrested two weeks ago for robbing cars, and since then the woman has been going about in men's clothes, watching for an opportunity to revenge herself for the arrest. Wednesday night she secured a bar of iron, concealed herself near the quarry switch, and after a freight train had passed wedged the iron into the frog and hurried away, knowing that the St. Louis express would be due in 15 minutes and that nothing but a miracle could save the passengers."

Accommodating Conductors.

The story of the conductor who, in the early days of railroading, stopped his train to allow the passengers to pick huckleberries, is paralleled by an occurrence at Cleveland Saturday morning. The Henry Irving company started for Detroit. Mr. Stephen Coleridge, son of the Lord Chief Justice of England, in waving them adieu, fell over a platform truck and thus engaged all their attention and sympathy. Suddenly, Miss Ellen Terry discovered that her pet dog was left behind. In a moment all was excitement. The engineer and conductor held a consultation, the outcome of which was that the train was run back to Cleveland and the dog put aboard. The distinguished foreigners then made another start, arriving at Detroit a little late.

But even this conductor must acknowledge himself outdone by one in Georgia. Mr. Ward Holt, conductor on the Southwestern road, being aware that Miss Georgia Laramore, of Americus, whom he would have gladly won, was to marry a prominent Macon merchant in a day or two, stepped over to the hotel veranda, where she was standing with a letter in her hand, and congratulated her. Holding up the letter, she said: "Do you see this? It is a request for a postponement, which I have granted." "Why," replied the conductor, whose train was now ready to leave, "I would not have agreed to that; do not postpone the wedding. If he is not ready, I am, and you know I love you; will you marry me?"

She drooped her head, drooped her eyes and the next moment raised them to his, and although filled with tears the answer was plain.

The conductor delayed his train for five minutes, procured his license from an ordinary who was within call, and in less time than it takes to tell it the two were made one, when the conductor, kissing his wife, pulled out with his train, having first telegraphed to Macon for a conductor to meet him midway. The relief arrived at the place designated, Mr. Holt returned to the arms of his bride, while the bride's letter of postponement to her jilted lover, by the kindness of the postmaster, was withdrawn from the mails.—Boston Advertiser.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies, which have been reviewed in previous numbers of the current volume of the *Railroad Gazette*:

Page.
N. Y., N. Haven & Hart..... 7
Perthland & Rochester..... 7
N. Y., Ontario & Western..... 7
Rome, Wat. & Ogdensburg..... 7
N. Y., West Shore & Buffalo..... 7
Worcester, Nashua & Rochester..... 7

Long Island.

This company owns a line from Hunter's Point, N. Y., to Greenport, 95 miles, with 87 miles of branches, 182 miles in all. It leases the Brooklyn & Montauk, the Flushing & North Shore and other branches, 172 miles in all, making a total of 354 miles worked. The report is for the year ending Sept. 30 last.

The general balance sheet is as follows, condensed:

Stock.....	\$10,000,000
Funded debt.....	5,712,081
Accounts and balances.....	177,940
Profit and loss, surplus.....	574,679
 Total.....	\$16,464,700
Road and equipment.....	\$13,873,537
Leased lines and advances.....	1,321,778
Stocks and bonds owned.....	1,065,183
Materials.....	55,102
Accounts receivable.....	44,459
Cash.....	102,641
 \$16,464,700	

The funded debt increased \$318,061 during the year, and cost of road and equipment increased \$143,765.

The earnings for the year were as below:

1883-84.	1882-83.	Increase, P. c.
Earnings.....	\$2,756,232	\$2,685,089
Expenses.....	1,750,919	1,083,814
 Net earnings.....	\$1,005,213	\$1,601,275
Gross earn. per mile.....	7.780	7.585
Net.....	2.840	2.828
Per cent. of exps.....	61.52	62.71
 \$4.038	201	2.7
44.459	12	0.4
62.71	0.81	...

Expenses include taxes paid, which were \$79,621 last year and \$73,109 in the preceding year.

The income account was as follows:

Net earnings, as above.....	\$1,005,313
Interest, less interest received.....	287,099
Rents.....	108,586
Personal damages for accidents.....	400,000
 Dividends, 4 per cent.....	987,161
 \$18,152	
Surplus, Oct. 1, 1883.....	556,527
 \$574,679	

Surplus, Sept. 30, 1884.....

The personal damages for which a special charge is made were in settlement for injuries received by passengers in the collisions at Hunter's Point and Springfield last summer.

Virginia Midland.

This company operates a main line from Alexandria, Va., to Danville, 282½ miles, with branches from Manassas Junction to Strasburg, 63 miles; Junction to Warrenton, 9 miles; Orange to Gordonsville, 9 miles; Madison Run to

timore & Ohio Co. at a rental of \$39,250 yearly. The report is for the year ending Sept. 30.

The traffic for the year was as follows:

1883-84	1882-83	Inc. or Dec.	P.c.
Passengers carried..	386,224	328,396	I. 57,828 16.3
Passenger-miles....	20,851,988	19,312,553	I. 1,539,435 8.0
Tons freight carried..	438,002	452,274	D. 14,272 3.2
Ton-miles.....	42,425,428	49,814,241	D. 7,388,813 14.8

There was a small decrease in local passenger traffic and a large increase in through travel. The decrease in freight was in through business, as explained below.

The earnings for the year were as follows:

1883-84	1882-83	Inc. or Dec.	P.c.
Freight.....	\$778,749	\$841,209	D. \$62,460 7.4
Passengers.....	582,034	552,126	L. 29,908 5.4
Mail and express.....	155,985	160,424	D. 4,439 2.7
Rents, etc.....	109,062	110,445	D. 1,383 1.2
Total.....	\$1,625,830	\$1,664,204	D. \$38,374 2.3
Expenses.....	960,217	950,195	L. 43,022 4.5
Net earnings.....	\$626,613	\$708,009	D. \$81,396 11.5
Gross earnings per mile.....	4.580	4.688	D. 108 2.3
Net.....	1,763	1,994	D. 2.9 11.5
Per cent. of expenses.....	61.27	57.45	I. 3.82

The increase in expenses was chiefly due to more extensive renewals and repairs made last year.

The income statement is as follows:

Net earnings, as above.....	\$626,613
Interest paid.....	\$374,000
Rentals.....	42,300
New construction.....	94,293
New equipment.....	104,548
Balance.....	815,141

Interest was paid on all the bonds except the income bonds. The balance above is applicable to those bonds.

During the year 26.2 miles of track were relaid with heavy steel rails and 103,652 new ties were used. The best of the iron rails taken up were used in repairing branch lines and for new sidings. The road-bed was very much improved in condition. A new iron bridge, 775 ft. long, was built over the James River, and several new station buildings put up. There are now 155 miles of the main line laid with steel. A new iron bridge over Tye River is needed.

Two ten-wheel freight and four heavy passenger engines were bought during the year, and one passenger engine built in the shops. More freight engines are needed, to replace light ones now in use, and the road also needs six new passenger cars and a number of stock cars. New stations are to be built at Lynchburg and Charlottesville.

The report says: "The through traffic of 1884 has been in great part lost to this line, owing to the fact that the completion of the Valley Branch of the Baltimore & Ohio to Lexington enabled that line to carry its Western business destined to Lynchburg, Richmond and points south thereof over the Richmond & Alleghany at Lexington, and the further fact that traffic for territory south of Danville has either gone into the southern territory by other routes or has greatly diminished in volume, and as a result of the above the freight revenue in 1884 is \$62,459 less than in 1883."

"In 1883 the transportation of coke for Lynchburg furnaces yielded \$20,000. In 1884 the furnaces have been supplied from the line of the Norfolk & Western, although not fully operated on account of the depression in the price of pig iron.

"Still it should be borne in mind that in 1884, when deprived of this through freight, the freight revenue of the line is \$71,378 more than in 1882, a year in which this company did not carry the through traffic."

Boston & Lowell.

At the beginning of its last fiscal year, Oct. 1, 1883, this company owned a line from Boston to Lowell, 26½ miles, with 60 miles of branches, and leased the Nashua & Lowell, 1½ miles, the Stony Brook, 13 miles, the Wilton, 15½, and the Peterboro, 10½ miles, making 140 miles worked. From June 1, 1884, it leased the Northern (New Hampshire), 83 miles; the Concord & Claremont, 57, and the Boston, Concord & Montreal, 186 miles. From July 1, 1884, it also leased the Nashua, Acton & Boston, 24, and the Manchester & Keene, 30 miles. Thus at the close of the year it worked 520 miles directly, besides some 40 miles more controlled in New Hampshire.

The old system and the New Hampshire leased lines are separated by the 35 miles of the Concord Railroad, with which the company has an operating contract.

The general account is as follows, condensed:

Stock.....	\$3,792,000
Bonds.....	3,546,400
Nashua & Lowell bonds.....	300,000
Notes payable.....	737,000
Accounts and balances.....	523,131
Profit and loss.....	465,415
Total.....	\$9,363,746

The bonds are plain bonds, maturing at various dates. The interest charge on them is \$234,829 yearly.

The earnings for the year were as follows:

1883-84	1882-83	Inc. or Dec.	P.c.
Passengers.....	\$1,301,113	\$924,630	I. \$378,463 41.0
Freight.....	1,382,145	1,094,746	L. 287,399 26.3
Mail and express.....	95,813	62,844	L. 32,939 52.3
Miscellaneous.....	85,057	85,531	I. 36,536 7.6
Total.....	\$2,864,128	\$2,128,701	I. \$735,367 34.5
Expenses.....	1,923,062	1,303,450	I. \$629,293 38.0

Net earnings..... \$941,469 \$735,302 L. \$266,164 28.0
Gross earn. per mile..... 10,932 15,203 D. 4,273 28.1
Net..... 3,593 5,252 D. 1,659 31.6
Per cent. of exps..... 67.13 60.76 I. 0.37

Taxes, included in expenses, amounted to \$113,041 last year. The comparison is on an average of 262 miles last year and 140 miles the previous year.

The income statement is as follows:

Net earnings, as above.....	\$941,466
Rents.....	\$323,406
Interest.....	251,859
New equipment.....	151,631
Balance, surplus.....	726,896

From the surplus one dividend of 2½ per cent. and one of 8 were paid, making 5½ per cent. for the year.

The new equipment bought included 8 locomotives, 16 passenger-train cars and a number of freight cars.

Passenger trains ran 1,305,150 miles; freight, 610,162; shunting and work, 595,869; total, 2,511,181 miles.

The report states that the net income of the road appears to have been about the same as for the previous year, but the improvements made and the additions to property and equipment in excess of similar additions last year render

THE RAILROAD GAZETTE.

[JANUARY 9, 1885]

RAILROAD EARNINGS IN NOVEMBER.

NAME OF ROAD.	MILEAGE.					EARNINGS.					EARNINGS PER MILE.					
	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	
EASTERN ROADS.																
Boston, Hoosac Tun. & West.	87	87				\$37,639	\$29,345	\$8,294	\$8		28.6	433	337	96	2.6	
Grand Trunk.....	2,918	2,704	124			1,340,164	1,638,973		298,809	18.2	459	587		128	21.4	
Long Island.....	354	354				180,555	182,509		1,074	1.1	510	516		6	1.1	
N. Y. & New England.....	400	400				254,421	310,092		55,671	17.9	636	775		137	17.9	
N. Y. Sus. & Western.....	147	147				97,275	86,783	10,402			12.1	662	590	72	12.1	
Northern Central.....	322	322				474,805	536,094		61,289	11.4	1,475	1,605		196	11.4	
Pennsylvania.....	2,150	2,070	80			3,950,938	4,473,480		522,542	11.7	1,838	2,161		323	14.9	
Rochester & Pittsburgh.....	204	294				96,300	82,885	13,475			16.2	328	282	46	16.2	
Total, 8 roads.....	6,672	6,468	204			6,432,157	7,340,161	32,261	940,265			904	1,135		171	
Total inc. or dec.....			204						908,004	12.4					171	15.1
SOUTHERN ROADS.																
Alabama Great Southern.....	290	290				122,944	108,838	14,106			12.9	424	375	49	12.9	
Chesapeake & Ohio.....	517	517				288,34	345,304		50,980	16.5	557	668		111	16.5	
Eliz. Lex. & Big Sandy.....	130	130				68,347	58,052	10,295			17.7	526	447	70	17.7	
Ches. Ohio & Southwestern.....	399	399				140,521	132,812	7,709			5.8	352	333	19	5.8	
Cin. N. O. & Tex. Pacific.....	336	336				225,268	234,425		9,157	3.9	670	698		28	3.9	
East Tenn., Va. & Ga.....	1,098	1,098				380,180	409,665		29,485	7.2	344	373		57	7.2	
Fla. Ry. & Nav. Co. t.....	498	477	21		4.4	91,187	102,819		11,642	11.3	183	216		35	15.1	
Kentucky Central.....	254	220	34		15.5	76,263	73,252	3,011			4.1	300	333	32	9.9	
Louisville & Nash.	2,065	2,065				1,184,285	1,307,394		123,109	9.4	574	633		111	9.4	
Mobile & Ohio.....	574	554	20			196,001	105,660		25,062	8.0	483	530		47	8.0	
Nashville, Chatta. & St. L.	574	554	20			122,715	147,046		24,331	16.6	349	418		69	16.6	
Norfolk & Western.....	512	503	9		1.8	244,810	271,1									

RAILROAD EARNINGS, ELEVEN MONTHS ENDING NOVEMBER 30.

NAME OF ROAD.	MILEAGE.				EARNINGS.				EARNINGS PER MILE.								
	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.		
EASTERN ROADS.																	
Bos., Hous. T. & W.	87	87	...	...	4.4	411,021	312,668	98,353	314,130	31.4	314	314	314	314	314
Grand Trunk	2,918	2,794	124	...	4.4	15,667,590	17,669,770	2,012,180	11.4	5,306	6,324	5,98	15.2	5,98	15.2		
Long Island	354	354	...	...	4.4	2,593,71	2,549,252	44,419	1.7	7,327	7,201	126	1.7	7,327	7,201
N. Y. & New Eng.	400	400	...	...	4.4	3,007,922	3,411,835	403,913	11.8	7,520	8,530	1,010	11.8	7,520	8,530
N. Y., Susq. & W.	147	147	...	...	4.4	946,524	929,832	16,692	1.8	6,439	6,325	114	1.8	6,439	6,325
Northern Central	322	322	...	...	4.4	5,079,608	5,678,979	599,371	10.6	15,775,17	15,637	1,862	10.6	15,775,17	15,637
Pennsylvania	2,126	2,060	66	3.2	44,797,582	47,242,738	2,445,152	52.1	21,071	22,933	1,862	8.1	52.1	21,071	22,933	1,862	
Rochester & Pitts.	294	216	78	30.1	1,051,928	581,861	470,067	80.8	3,578	2,604	884	32.8	80.8	3,578	2,604	884	
Total. 8 roads.	6,648	6,380	268	...	4.2	73,545,850	78,376,935	620,531	5,460,616	...	11,063	12,285	1,222	8.1	11,063	12,285	1,222
Total inc. or dec.	268	...	4.2	4,831,085	6.2	0.9	0.9	

	SOUTHERN ROADS.																
	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.		
Ala. Gt. Southern	290	290	...	...	4.4	1,007,761	982,834	41,927	4.6	3,475	3,320	155	4.6	3,475	3,320	155
Ches. & Ohio	517	517	...	...	4.4	3,241,940	3,600,408	358,408	9.9	6,271	6,964	693	9.9	6,271	6,964	693
Eliz., Lex. & B. S.	130	130	...	...	4.4	604,162	661,573	32,586	4.9	5,340	5,099	251	4.9	5,340	5,099	251
Ches. O. & S. W.	399	399	...	...	4.4	1,237,896	1,166,344	41,652	3.5	3,102	2,998	104	3.5	3,102	2,998	104
Cin., N. O. & Tex. P.	333	336	...	...	4.4	2,362,710	2,331,508	1,202	0.1	7,032	7,028	4	0.1	7,032	7,028	4
East Tenn., Va. & Ga.	1,098	1,080	18	1.7	3,610,819	3,769,330	152,511	4.0	3,254	3,450	196	5.6	3,254	3,450	196		
Fia. Ry. & Nav. Co.	488	477	11	2.3	877,224	835,710	23,514	2.7	1,788	1,790	8	0.4	1,788	1,790	8		
Kentucky Central	2,026	2,053	12	0.6	12,353,027	12,867,324	542,297	4.2	5,983	6,282	209	4.7	5,983	6,282	209		
Louisville & Nash.	528	528	...	...	4.4	1,877,443	1,977,336	93,953	8.9	3,630	3,547	13	1.5	3,630	3,547	13
Mouille & Ohio	560	554	6	1.1	2,161,170	2,118,895	42,275	2.0	3,859	3,842	17	1.8	3,859	3,842	17		
Nash. Chat. & St. L.	195	91	104	114.3	439,771	119,987	316,784	206.5	2,255	1,318	937	71.1	2,255	1,318	937		
N. O. & N. E. R.	504	470	34	7.2	2,484,050	2,579,923	115,873	4.0	4,889	5,489	606	10.9	4,889	5,489	606		
Rich. & Danville	363	339	24	7.1	693,620	750,987	57,337	7.6	1,911	2,215	304	13.8	1,911	2,215	304		
Char. Col. & Greenl.	996	206	...	...	4.4	1,474,485	1,567,749	93,264	5.9	4,189	4,454	265	5.9	4,189	4,454	265
Va. Midland	352	352	...	...	4.4	2,078,903	2,388,242	23,465	3.5	4,753	4,692	161	3.5	4,753	4,692	161
Western N. C.	214	199	15	7.5	402,876	348,253	54,623	15.7	1,883	1,750	133	7.6	1,883	1,750	133		
Shenandoah Valley	240	249	...	...	4.4	683,951	701,402	107,451	13.6	2,747	3,178	451	13.6	2,747	3,178	451
South Carolina	247	245	2	0.8	1,102,096	1,198,161	96,005	8.0	4,462	4,980	425	8.7	4,462	4,980	425		
Vicks. & Meridian	142	142	...	...	4.4	441,867	460,697	18,830	4.1	3,055	3,180	136	5.6	3,055	3,180	136
Total. 21 roads.	9,986	9,724	242	...	4.2	42,097,898	43,170,580	620,821	1,711,503	...	4,224	4,441	217	...	4,224	4,441	217
Total inc. or dec.	...	...	242	...	4.2	...	...	1,081,682	2.5	...	...	...	4.0	...	...	4.0

	CENTRAL GROUP.															
	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	1884.	1883.	Inc.	Dec.	P. c.	
Chi. & Eastern Ill.	252	252	...	...	4.4	1,419,318	1,516,527	97,200	6.4	5,643	6,018	373	6.4	5,643	6,018	373
Chi. & West Mich.	410	403	7	1.7	1,375,129	1,430,800	55,680	3.9	3,354	3,550	196	5.5	3,354	3,550	196	
Cin., Ind., St. L. & Chi.	342	342	...	...	4.4	2,223,727	2,305,428	80,224	3.5	6,502	6,741	239	3.5	6,502	6,741	239
Cin., Wash. & Balt.	284	284	...	...	4.4	1,213,066	1,174,052	161,886	0.4	5,680	6,235	470	0.4	5,680	6,235	470
Clev., Akron & Col.	144	144	...	...	4.4	443,601	490,947	46,446	0.3	3,081	3,403	322	0.5	3,081	3,403	322
Det., Lan. & No. W.	258	242	16	6.6	1,240,213	1,478,543	238,330	16.1	4,807	6,118	1,303	21.4	4,807	6,118	1,303	
Ev. & Terre Haute	146	146	...	...	4.4	693,905	670,440	23,465	3.5	4,753	4,692	161	3.5	4,753	4,692	161
Flint & P. Marq.	362	348	14	4.0	2,078,903	2,388,242	275,239	12.8	5,740	6,760	1,022	15.1	5,740	6,760	1,022	
Illinois Central	1,539	1,503	36	2.4	9,318,240	10,018,000	609,820	6.0	6,035	6,663	610	9.2	6,035	6,663	610	
Ind., Bloom. & W.	690	696	...	...	4.4	2,449,049	2,724,720	278,703	10.2	3,514	3,915	461	16.2	3,514	3,915	461
Ohio Central	212	212	...	...	4.4	1,017,200	1,002,479	14,781	1.5	4,747	4,723	68	1.5	4,747	4,723	68
Ohio & Mississippi	615	615	...	...	4.4	3,719,447	4,161,338	443,891	10.6	6,048	6,778	730	10.6	6,048	6,778	730
Ohio Southern	130	130	...	...	4.4	424,896	328,883	96,003	2.3	3,268	3,230	738	2.3	3,2		



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE USE AND ABUSE OF TOPOGRAPHY.

In reading the many letters called out by a query in the *Railroad Gazette* of Nov. 5—the twelfth is published this week—one is reminded of the old fable of the two knights who fell to fighting over the shield which seemed gold or silver according to the “point of view”; for the question under discussion is also one with two sides to it, both of which are important and equally true. It is only by losing sight of one side or the other that one becomes a strong partisan of either.

The difference between the two views, in fact, is more imaginary than real. On the one hand, there are no engineers of any standing or experience who believe that location offering any difficulties can be made to advantage in any other way than from topographical notes embodied in a more or less elaborate topographical map; while on the other hand, there are no engineers of experience who would think of claiming that more topography than is really necessary for intelligently completing the location, and making sure that it is correct, should be taken.

The true difference between the two sides, therefore, is simply *how much* topography should be taken, and where the line should be drawn. There is no such difference of opinion as would appear from an error into which one or two correspondents have fallen—an error which well shows how completely the views of those who take one side of this question are misapprehended by those who think they disagree with them;—that is to say, there is no class of engineers who attempt to make a final location assisted by the natural eyesight alone, or in any other way than by working from a preliminary line as a basis, which is intended to lie, and if skillfully run does lie, very close to the line on which the final location is placed.

To mark the limits of the debatable ground as closely as possible, there is probably no one who will question (1) that in proportion to the skill of the engineer this preliminary line (often at difficult points necessarily the result of two or three trials) will approximate more and more closely to where the final location will ultimately lie; (2) that it should and in general will lie nearer than the 300 or 400 ft. spoken of by our last correspondent; (3) that the placing of this preliminary line upon the ground is and must be purely a matter of individual “eye for country” and good judgment, and (4) that the really vital and dangerous errors of location, the selection of the general route, the system of gradients, the going to or passing by the local towns, etc., etc., are committed, if committed at all, before any topography whatever has been taken, in locating this preliminary

line; the usefulness of the topography beginning only after the more momentous question of *where to put preliminary* has been decided, and serving only for the more ready and perfect adjustment of details—details which have an important effect upon the cost of construction, indeed, but do not otherwise seriously modify the earning capacity of the line.

The remaining ground for difference between extreme advocates of either side is this: The extreme believer in topography is indifferent to getting his preliminary very near to his ultimate location, looking upon 400 or 500 ft. average distance apart as near enough (as our correspondent implies in another column, but probably without intention), and takes or causes to be taken a wide belt of accurate topography to save the need of a new or a better preliminary. But the advocates of the other view say, “No; the engineer who can be trusted to put a preliminary line within even 500 ft. of the true location can and ought to, in general, put it much nearer; or if not, it is cheaper to put a new line through still closer to the ultimate location than to take so wide a belt of topography. By one method or the other the good engineer can and will bring the line so near to where his location should lie, that the topography which he will really need will be only a very narrow belt, usually no more than a few series of cross-sections and hardly amounting to a topographical map at all.”

The truth seems to lie somewhere between these two limits. Since the amount of topography ultimately needed and used (when its use is not abused by making it serve as a substitute for the careful placing of the preliminary) can be seen on any map to be very little, no one will deny that covering a map all over with accurate topography is a sign of weakness and not of strength. On the other hand, every one who has tried it knows that accurate topographical contour lines for a reasonable and moderate distance on each side of the line are an immense assistance for the ready projection of lines, and at points can hardly be dispensed with. It is also an important truth that the usefulness of topography is not confined simply to that portion used to project the line adopted, but extends also to the portion which enables one to make sure that no other and better alignment might have been adopted. However confident an engineer may feel that he has in fact studied his work to the best of his ability, he owes it to himself and to his employers to have the ocular evidence of that fact before him, to be placed before others if need be, and it is but reasonable that no study of the ground alone, unassisted by accurate maps, can be as complete as one which has been so assisted. Yet on the other hand it is doubtless even more emphatically true that no study of maps alone, unassisted by study of the ground in detail, both before and after the making of the maps, can be as complete as it should be.

Most of those even who are strong believers in the proper use of contour maps will disapprove of such elaborate reliance upon maps alone as our last correspondent seems (but perhaps only seems) to advocate; taking the nice precautions for computing notes for 10 miles of location at once, so that it shall fit *geometrically* on to the preliminary and so dispense with renewed and more detailed study of the ground. Not but that the field work and mapping might be done so accurately that this would be all that would be necessary, and not but that much of a location so made may prove on examination to be beyond improvement, at least by the same engineer; but that for several practical reasons it seems inexpedient to rely so largely upon paper location. Among these are:

1, and most important, the length and depth of cuttings and especially the classification do not impress themselves upon the mind so forcibly in studying a topographical map as in studying the ground, and hence as great efforts will not be made, practically, to avoid this danger when the principal study of the details of the line is made upon the maps as when the paper location is looked upon as at best nothing more than a close approximation, and the last study of the ground is made with the rock cut staring one in the face or on large scale cross sections.

2. A very dangerous error, which the best engineers find it hard to avoid altogether, is especially hard to avoid in making paper locations, which is, to regard a certain *horizontal approximation to the grade points* as about the proper thing, thus leading to altogether too much curvature and respect for the contours in easy country, and altogether too little of both at the more difficult points. The watchful engineer finds himself drifting into this error continually, guard against it as he will. It results in part from a natural, but evidently erroneous, tendency to look on a certain percentage of decrease of curvature, for example, as worth a certain percentage of increase in the work, instead of being merely worth a certain absolute sum,

which on easy work justifies great disregard of contours and on heavy work requires close accordance with them.

3. The best topographical maps which it is either expedient or, in general, possible to make, with the time, money and men at command, *cannot* be relied on within a foot, nor even 5 or 10 ft., at critical points, especially over any such width as 500 ft., on each side. Over most of their area, if well made, they will be trustworthy, but minor irregularities of considerable importance, if nothing more than a few big boulders, get smoothed out of the map or misplaced or exaggerated, so that the only safe rule is to look on the first location, however carefully studied, as still open to much improvement,—an expectation which will rarely be disappointed. But if frequent minor changes are to be made, much of the advantage of computing a first location so precisely on paper is lost.

4. To run in long stretches of location successfully without further topographical tests, but only the geometrical test of a “tie” to a preliminary, requires the nicest field and office work from the beginning to the end of the survey. It is, of course, only a question of degree. No one would advocate anything but good work of the kind, but it is obvious that less precision is required, if it is fully understood and expected that the paper location will be topographically tested throughout, than if it is expected to be, in the main, a finality. But this saving of needed precision means some corresponding saving of time and money which, as Mark Twain said of his profanity, “can then all be saved and devoted to some other end, where it will do more real and lasting good.”

The “conclusion of the whole matter” would therefore seem to be that accurate topography for a certain narrow strip is a highly useful adjunct to practical location, which should never be omitted altogether and should generally be very carefully taken and studied, but that it is in no way a safeguard against anything but minor errors of location and is not a safe, or at least expedient, reliance for giving the last degree of perfection even to the details of alignment. Great differences in natural aptitude for location exist, and among the strongest believers in the absolute necessity of elaborate topography may well be some who have less of this natural aptitude and hence will not make very good use of the best of maps, while on the other hand those who have or think they have such aptitude may be led thereby to be over confident and commit errors which good topography would reveal to them.

But another truth should not be forgotten. It is easier to put a line of some kind or other, on a topographical map than on the ground; but to do the best that the ground admits is almost as hard, and takes almost as much study and skill, on the contour map as on the ground. This the inexperienced projector, of good natural parts, will soon find out if after having put in a paper location, which he thinks is very good, he will start in over again on the assumption that it is all very bad, and give two or three times more thought and care than before to finding out wherein it is bad. He will probably soon be satisfied that his assumption was correct, by finding his curvature and quantities simultaneously diminishing.

There are, of course, extremes of country, both easy and difficult, to which nothing that has been said here, or presumably in our correspondents’ letters, has been intended to apply. On nearly flat country, contour maps are neither possible nor needed. On the other hand we have in mind a locality where anything like an attempt to run a line as a guide to location would have been ridiculous, and nothing less than a thorough topographical study of an area about as broad as it was long was of any avail.

GRAIN RATES FOR TWENTY YEARS.

It was about the year 1872, we believe, that we first endeavored to collect some records of the history of freight rates between Chicago and the seaboard. It was only with great difficulty that any records could be found extending more than a few years back. The Chicago fire had destroyed what may have been there, but it appeared that railroad officers were not in the habit of preserving rate sheets long, and no one seemed to know where to find the information desired.

Fortunately a file was found preserved in the office of the General Freight Agent of the Lake Shore & Michigan Southern Railway at Cleveland, going back to 1864, from which we compiled a history of the changes. Recently Mr. C. W. Bullen, Secretary of the Joint Executive Committee, has supplemented these records by completing them down to date, and we are thus able to present all the recorded changes in the grain rate from Chicago to New York since

March, 1864—nearly 21 years, which are given in the accompanying table:

Chicago-New York Grain Rates for 20 Years.			
(In cents per 100 lbs.)			
Date.	Rate.	Date.	Rate.
1864:		1869:	
Mar. 28...	100	Jan. 1...	75
April 4...	90	Jan. 25...	70
April 12...	80	Mar. 11...	50
April 14...	75	1870:	
July 11...	80	Jan. 1...	50
July 22...	85	Jan. 22...	55
July 28...	80	Mar. 4...	50
Sept. 7...	90	Mar. 22...	45
Sept. 10...	95	May 23...	40
Nov. 12...	100	Aug. 29...	45
Nov. 16...	115	Aug. 31...	50
Nov. 28...	125	Oct. 21...	55
Dec. 13...	138	Nov. 22...	60
Dec. 24...	160	1871:	
1865:		Jan. 1...	60
Jan. 1...	160	Mar. 4...	50
April 22...	100	April 7...	45
May 15...	70	June 26...	40
Sept. 6...	62½	July 10...	45
Sept. 11...	70	Aug. 11...	50
Sept. 27...	77½	Sept. 21...	55
Oct. 10...	85	Oct. 2...	60
Oct. 17...	95	Oct. 25...	65
Oct. 27...	105	1872:	
Nov. 2...	115	Jan. 1...	65
Nov. 7...	120	Mar. 25...	60
Nov. 9...	130	May 1...	50
1866:		1880:	
Jan. 1...	130	Jan. 1...	40
Jan. 9...	80	Sept. 2...	50
Feb. 23...	70	Sept. 9...	55
May 11...	55	Sept. 16...	60
June 7...	60	Oct. 14...	65
July 5...	65	1873:	
Sept. 18...	75	Jan. 1...	65
Sept. 27...	85	April 14...	60
Oct. 10...	90	May 20...	45
Oct. 15...	100	Sept. 5...	50
Nov. 5...	105	Nov. 20...	55
Dec. 8...	90	Dec. 8...	60
1867:		1881:	
Jan. 1...	90	Jan. 1...	60
Feb. 7...	80	Feb. 3...	55
Mar. 4...	70	April 15...	40
Mar. 22...	60	May 6...	45
April 15...	50	Dec. 11...	40
June 8...	75	1882:	
June 21...	70	Jan. 1...	40
Sept. 2...	75	Mar. 25...	25
Sept. 23...	85	Oct. 1...	30
1868:		1883:	
Jan. 1...	85	Oct. 12...	40
Sept. 1...	60	Dec. 1...	45
Sept. 7...	65	1876:	
Sept. 14...	70	Jan. 1...	45
Dec. 6...	75	Nov. 26...	30
Dec. 18...	30	July 21...	25

Before considering the history of the rates as shown by this table, we should consider its limitations. In the first place it gives only regular schedule rates, such as were printed in the company's circulars to shippers. Now, it perhaps was always intended that these printed rates should be the basis of the rates actually charged, but in the earlier years much more than now great freedom was exercised in negotiating with shippers in making concessions from regular rates, paying rebates, etc. Thus the regular rate doubtless did not so nearly represent the actual rate in those days as it does now when there is no great disturbance. Irregularities which were common and expected then would not be thought permissible now; and we know that there are now considerable deviations from regular rates that do not result in an open rupture, and of which there is no trace in a file of published rates—as, for instance, since last July.

But aside from these deviations from the regular rates which may be called usual and customary, always existing to some extent, but to a greater extent previous to 1879 than since, we have to count with periods of great irregularity and open railroad war when there are no schedule rates—when the last schedule issued does not in any degree represent what the rates are, and no new one is issued because fluctuations are so great. When for a long time no change is shown in the schedule rate, it is possible that there was a period of railroad war or something like it, and if it was long ago, it may now be impossible to discover whether this was so or not.

We should say that for 1879 and 1881 we have given in the record figures representing approximately the actual rates charged, instead of schedule rates which are known not to have been observed.

Down to 1879 the rates were quoted in a depreciated and fluctuating currency, which at times made them very much greater than if they had been in the present standard gold currency. The rates are truly very much less now than they used to be; but the decline since 1865 has been not nearly so great as the figures make it appear. For instance, when the \$1.60 rate was made, Dec. 24, 1864, gold was at a premium of about 122 per cent., and the \$1.60 in currency would bring but 72½ cents in gold. The decline from 72½ cents then to 25 cents now is truly a great one, but it is not properly 84 per cent., as would appear from the currency figures, but less than 66 per cent. The lowest rate of 1864, 75 cents, was made when gold was 175, and amounted to but 43 cents in gold—large in proportion to the 15-cent rate at the same time last year, but not 187 per cent. greater, as appears from the schedule figures. To check the effect of the premium on gold, we give below the gold value of the highest and lowest rates

in each year at the time the rates were made down to the time of the disappearance of the premium on gold, in cents:

Year.	Highest.	Lowest.	Year.	Highest.	Lowest.
1864	60	43	1872	58	40
1865	83	43	1873	58	38
1866	83	43	1874	54	36
1867	68	37	1875	38	27
1868	64	41	1876	40	18
1869	55½	38	1877	39	29
1870	53	35	1878	39	20
1871	58	36			

Thus, from the end of the war to the close of 1878 both highest and lowest rates had been reduced something more than one-half.

Since 1878, during a period when there has been an organization of the railroad companies to prevent the irregular reduction of rates, the highest and lowest in each year have been:

Year.	Highest.	Lowest.	Year.	Highest.	Lowest.
1879	40	10	1882	30	12½
1880	40	30	1883	30	25
1881	40	12½	1884	30	15

Thus in the last three years the highest winter rate has been one-fourth less than in the three years previous, and now, in 1885, we have a winter rate of 25 cents, still lower than any heretofore established for the winter. The co-operation of the railroads, it appears, even when most successful, has done nothing toward restoring the rates such as prevailed before 1876, and has not prevented a further decline in the regular schedule rates, such as the railroads have desired to maintain, much of the time without succeeding.

The object of their ambition this winter has been to maintain a 25-cent rate, which until 1883 had always been held as too low for a summer rate. The danger to the public that has been apprehended from the co-operation of the railroads, that it would enable them to collect exorbitantly high rates, has therefore not been realized. When co-operating most faithfully the rates established have been low and have been made lower from time to time. Aside from the exceptionally low rates made during railroad wars, or in consequence of less serious irregularities, which should be thrown out altogether as not reflecting the purposes of the co-operating companies, nor what they would be able to accomplish if they had had a closer organization, we find that with navigation closed they made a rate of 40 cents in the fall of 1879, 35 in 1880, 30 in 1882 and 1883, and 25 in 1884, and meanwhile the summer rate which they have desired to make has fallen from 30 to 25 cents—certainly as great a cheapening of one of the greatest elements in the cost of production as the most sanguine could have hoped for.

But it is evident that there can be no such reduction of rates hereafter. The charge having fallen from 83 to 25 cents, there is little room left for it to fall. Nowhere else on earth are rates so low; and whatever reduction in working expenses may be made hereafter, it cannot make it possible to reduce a charge of 25 cents by 58, 40, or even 25 cents.

It is probable, indeed, that it will be long before there is any reduction. A 25-cent rate leaves so small a margin over the cost of transportation that there will be little interest in securing traffic if there is a further reduction.

November Earnings.

Our table this week has reports of the November earnings of 79 railroads whose aggregate mileage and earnings and average earnings per mile were:

1884.	1883.	Inc. or Dec.	P. c.
Miles ...	62,428	59,984 +	2,444 4.1
Karangs ...	\$32,710,000	\$35,913,120 -	\$3,203,120 8.9
Earns. per mile...	524	599 -	75 12.5

This is a more unfavorable showing than in any previous year, the percentage of decrease in earnings per mile in successive months having been:

P. c.	P. c.	P. c.
Jan. ... 9.1	May ... 2.8	Sept. ... 10.2
Feb. ... 6.8	June ... 10.9	Oct. ... 10.8
March ... 10.8	July ... 7.5	Nov. ... 12.5
April (Inc.) ... 1.5	Aug. ... 12.1	

It can hardly be said of any of these months that they were good months, but some were worse than others, and the last four were very bad, with November the worst of all.

The number of roads in the Far West that have reported early enough for our tables is unusually large, and represents the condition of traffic west of the Missouri and Texas better than it is shown in any other part of the country, almost every important road being given, except the Oregon Railway and Navigation Company and the Atlantic & Pacific. The Atchison, Topeka & Santa Fe, the Central Pacific, the Denver & Rio Grande and its Utah extensions, the Oregon & California, the Union Pacific and the Utah Central make up the total of what we have called the "Far Western" group, classing the Northern Pacific and other lines northwest of St. Paul by

* Irregular reductions of as much as 5 cents were common in the last half of the year.

themselves, and the Chicago, Burlington & Quincy, which has a very important system west of the Missouri, with the Chicago roads.

Now this Far Western group in November had:

1884.	1883.	Inc. or Dec.	P. c.
Miles ...	12,006	11,846 +	160 1.3
Earnings ...	\$6,456,500	\$7,147,630 -	\$691,430 9.7
Earns. per mile...	538	604 -	66 10.9

Here there is very little change in mileage, and a loss of 9½ per cent. in earnings, earnings per mile having fallen off 11 per cent., which is a little less than the average decrease of the whole country. None of these roads has any increase in earnings. The Colorado and Oregon roads have the largest percentage of decrease. The Atchison, Topeka & Santa Fe, in spite of the great Kansas crops, has a large decrease, and its earnings were less than in any previous November since 1880, since which year they had changed very little. The Union Pacific, which has more than a third of the mileage and earnings of the whole group, had a little more than the average decrease in earnings per mile, but less than the average of the whole country.

North of these roads, and extending a little further east, we have the four roads northwest of St. Paul, showing:

1884.	1883.	Inc. or Dec.	P. c.
Miles ...	6,871	5,873 +	998 17.0
Earnings ...	\$2,803,024	\$2,764,917 +	\$38,107 1.4
Earns. per mile...	408	471 -	63 13.4

This group, we see, had an increase in total earnings, but its increase of mileage was so great that the decrease in earnings per mile was greater than in the group previously discussed. Six-sevenths of the increase of mileage was by the Canadian Pacific, however, and the St. Paul & Duluth and the Manitoba had an increase in total earnings and make a very favorable showing. The Northern Pacific was the only one having a decrease in total earnings, and its decrease was large.

The gains and losses of this group of four roads in successive months have been:

Av. June.	July.	Aug.	Sept.	Oct.	Nov.
\$350,335 +	\$156,320	-\$114,400	+\$152,178	+\$291,218	+\$38,107

Thus their gains were less in November than in any other month except August.

Fourteen roads west and northwest of Chicago report:

1884.	1883.	Inc. or Dec.	P. c.
Miles ...	17,413	16,854 +	559 3.3
Earnings ...	\$8,700,718	\$9,786,205 -	\$1,085,487 11.1
Earns. per mile...	500	581 -	81 12.4

The decrease is somewhat greater than on the two groups further west which we have just considered, and is certainly very large. Every one of the 14 roads has a decrease in earnings per mile as well as total earnings, the greatest being by the Iowa lines of the Illinois Central and four small roads in Northern Wisconsin and the Upper Peninsula of Michigan. Thirteen of these roads which have reported in previous months have had aggregate decreases as follows:

June.	July.	Aug.	Sept.	Oct.	Nov.
\$379,036	\$101,281	\$628,757	\$477,685	\$534,487	\$756,605

The decrease is a little greater in November than in any previous month.

make a better showing than any other group. Indeed half of them had an increase in total earnings and eight an increase in earnings per mile. Some of these gains were large, as 17.7 per cent. by the Elizabethtown & Big Sandy, and 27.7 by the Columbia & Greenville, not to speak of 29.8 by the new Georgia Pacific and 82.4 by the New Orleans & Northeastern. The latter had nearly as large earnings per mile as the old Mobile & Ohio. The large decreases are by the Shenandoah Valley, the Virginia Midland and the Chesapeake & Ohio.

The 21 of these roads that have reported heretofore had the following aggregate decreases in successive months :

July	Aug.	Sept.	Oct.	Nov.
\$129,863	\$337,092	\$406,927	\$456,348	\$219,574

Thus the decrease in November is less than in any month except July.

Eight Eastern roads report:

1884	1883	Inc. or Dec.	P.C.
Miles 6,672	6,468	+ 204	3.1
Earnings \$6,432,157	\$7,340,181	\$908,074	12.4
Earn. per mile.. 934	1,135	171	15.1

The Reading is missing from this table, and likewise the Eastern and the West Jersey. The remainder show a larger decrease than the average of the country. The Pennsylvania has about 30 per cent. of the mileage reported in this group of roads, and more than 60 per cent. of the earnings. The Grand Trunk has 44 per cent. of the mileage and 204 per cent.

We have thus passed in review all the different groups of states. The decrease has been greatest on the Eastern and the Northwestern railroads, and least in the Southern and Southwestern states.

Nut-Locks in Use.

The statistics presented in another column of existing practice as to nut-locks indicate that, to a somewhat surprising extent, in the race for favor between them, it is at present the Verona (steel ring) against the field, with the "odds" decidedly in favor of the Verona, so far as present practice and preference can fairly indicate them, there being now in the United States 60 officers of maintenance of way who favor the Verona to 40 who favor any one among all of the other devices, with, say, 20 more who are non-committal or in doubt, and therefore have not been counted at all.

We have endeavored in presenting these statistics of the existing status, however, to call special attention to the fact that no comparison of this kind can be a fair one as respects *merit*, since the various nut-locks have not had an equal chance. Some of those in the list, like the Iron City, Van Kuran, Van Dusen, Howe, etc., are of very recent introduction. Others, like the vulcanized fibre, though old in some form, are quite new in their present form, having had recent improvements made in them which may well alter their entire character and overcome all previous defects. The nut-lock question is, from its nature, not one which can fairly be considered at any time—certainly not at the present time—as absolutely settled, since a new device more meritorious than any other is always a possibility. It may well be that it is a greater indication of merit for a new nut-lock to have secured the approval of one or two lines than for an old one to have secured the approval of many. Nevertheless, when not abused by drawing unfounded deductions from them, statistics of present practice have their usefulness, even in an ever open question like that of nut-locks, and it is clear that the Verona must have had merit to enable it to get and keep its present predominant position, which seems to be confined to no section or class of lines. This is evident from the following figures giving the percentage of the total positive vote (omitting non-committal responses) which was in favor of the Verona :

	Companies.	Miles.
North and East	60.7 p. c.	58.5 p. c.
South	68.6 p. c.	56.0 p. c.
Northwest and Pacific	58.8 p. c.	65.5 p. c.
Total United States	62.4 p. c.	59.8 p. c.

The uniformity in these percentages is surprising. That the Verona, however, is not an ideally perfect nut-lock is evident from the fact that it throws an oblique strain upon the bolt, an evil due to the sharp bend about $\frac{1}{2}$ in. back from the ends which most of the nut-locks have as now manufactured, probably to give a better cutting edge and greater elastic resistance, and which it would seem impossible to flatten out fully in average practice so that considerable spring of the bolt would not be necessary to give the nut an even bearing. A number made this objection to the nut-lock, and it is one from which many of the others, whatever their other demerits, are free.

Electric Propulsion for the New York Elevated Railroads.

We publish on another page a report in which the writer estimates that an important saving in fuel can be effected by superseding locomotives by electric motors driven by electricity derived from dynamos at a central station. The proposal is not altogether new, having been urged some time ago by Mr. Whiteside Rae and others. We took occasion to point out in these columns* that the estimates as to economy were based on very erroneous ideas as to the power necessary, the consumption of fuel on locomotives per unit of power developed, and the cost of the large stationary plant requisite for generating the electricity. Our defence of the locomotive has apparently convinced electricians that it is not quite so extravagant an engine as they supposed. Mr. Rae estimated that each locomotive on the elevated railroads indicated on an average 18 horse-power on a consumption of 28 lbs. of coal per indicated horse-power per hour. Professor Farmer, ten months later, estimates that on the Second avenue line (where the trains are lighter than the average of the elevated road), the consumption of fuel is only 5 lbs. per indicated horse-power, and the average power 110 horses. The difference is significant, and the conviction that one, at least, of these reports is wide of the mark is strengthened by the fact that one estimates the coal used by the locomotives costs \$8 per ton and the other \$4 per ton.

We would respectfully suggest that before attempting to supersede the locomotive, it would be just as well to ascertain what work the locomotive actually performs and what it actually costs to run it. These are facts which can be ascertained, and if the reports differ so enormously as to what is going on before our eyes, what value can they possibly have when they enter into the dim region of prophecy and give estimates of the saving to be effected by methods of propulsion that have as yet given, as we shall show, very poor results as regards economy of power?

Professor Farmer assumes that the dynamos and electric motors will deliver as useful work in propelling the train, 81 per cent. of the power put into the dynamos by the stationary engine. This differs enormously from the results attained in actual practice. A railroad worked by electric motors has been in use for over two years at the Zankerode colliery in Prussia, the line, electric motors, etc., being made by the well-known firm of electricians, Messrs. Siemens & Halske, of Berlin. The result, however, is that the electric motor develops 30 per cent. of the power indicated by the stationary engine that works the dynamo. Further improvements in dynamos and electric motors may reduce the gap between the estimated 81 per cent. and the actual 30 per cent., but until that is done, electric propulsion cannot claim a saving of fuel as one of its advantages

Judge Cooley's award of percentages of the Chicago freight and live stock shipments makes but small changes from the award of the first arbitration and is made to date Oct. 2, when it was agreed that the question should be reopened. It was then left for him to decide whether any changes which he should order should date back to cover any of the shipments under the first award—that is, any made after Jan. 8. Under the first award, which was not made until July, though it covered the business from Jan. 8, the Chicago & Grand Trunk was largely "over," and it objected to paying over the balances due the other roads on account of its excess, declaring that the arbitrators had neglected to consider important elements in the case. The other roads insisted that the whole existence of their combination depended upon the acceptance of arbitrations when once made, and they refused to take any new steps whatever in the matter until the Grand Trunk should pay the balances which had been declared due from it. This it finally agreed to, the other roads having consented that the question should be admitted to a new arbitration.

The chief change made by Judge Cooley in this new arbitration from the first award is said to be an addition of $1\frac{1}{2}$ per cent. to the Chicago & Grand Trunk's share of the live stock and dressed beef, which is taken chiefly from the Lake Shore and the Baltimore & Ohio. By the first award the Chicago & Grand Trunk's share was 19 per cent. The revenue from this business at full rates is something less than \$8,000,000 a year, and therefore the additional $1\frac{1}{2}$ per cent. should yield something less than \$45,000 a year, gross. Judge Cooley makes no change in this road's share of the other freight (12 per cent.), but he somewhat reduces the share of the Chicago & Atlantic, and increases that of the Nickel Plate, the

last of which had 7 per cent. and the first 10 per cent. by the first award. The Nickel Plate for some time has been carrying much more than the share allotted it.

The present irregularities in east-bound rates are charged to two principal causes: shipments, chiefly from St. Louis, by way of the Chesapeake & Ohio to Newport News for export, and shipments below tariff rates which reach New York or Boston by the West Shore and the Lackawanna roads, but which are brought to them at Buffalo by the Grand Trunk. It was resolved at the last meeting of the Joint Executive Committee that no road in the pool would carry for roads in or out of the pool (meaning the West Shore and the Lackawanna) freight on which less than the regular rate is charged. If this resolution were carried out, at this season of the year the West Shore and the Lackawanna would be forced to maintain rates, except on what grain they could get from the Buffalo elevators. But it is claimed that they do not maintain rates, and that the Grand Trunk continues to bring them large quantities of freight, especially from Milwaukee.

The competition of the Chesapeake & Ohio is something that was naturally to be expected whenever there should be a large crop in the southern part of the grain district and an export demand. The Chesapeake & Ohio has been completed to the mouth of Chesapeake Bay, whence there have long been considerable exports of cotton, and which is nearer than Baltimore to Liverpool by the whole length of Chesapeake Bay. From St. Louis and Ohio River towns the distance to Newport News is not much more than to Baltimore, and the agreement is that the rate shall be the same to both. If vessels were as sure of cargoes, they would ask no more to carry from Newport News than from Baltimore. But our export business usually has to be nursed in its infancy, and the Chesapeake & Ohio is said to be nursing this infant business at the capes of the Chesapeake, chartering vessels and giving export rates such as will secure cargoes for them by the time they sail. The circumstances most favorable for the development of this business would be a large crop directly in the Ohio Valley—in Southern Ohio, Indiana and Illinois, and in Kentucky—and a very heavy export movement. This would keep all the older roads busy at good rates, and enable the Chesapeake & Ohio to get a large business and establish an export trade by a cut, which would still leave it a tolerable profit. As it is, most of the grain it gets must come from Missouri and Kansas, from which the Chesapeake & Ohio is a pretty direct outlet, and the traffic is so thin that it cannot be diverted to a new route without being felt. More has gone from St. Louis by this route recently, it is said, than by any other road; but the St. Louis shipments are not usually very large, and the amount cannot be very great, our total exports being small now. We do not hear that shipments are made to New York by this route, and they cannot be made economically.

There are again irregularities in the rates on east-bound freight, which are especially to be deplored at this season, as they may destroy the profit of the winter's business, which ought to be large, while after navigation opens large profits from the through business are usually impossible, because if the rates are remunerative the grain goes by lake. Moreover, it has usually been impossible to restore rates when there has been much cutting early in the winter. In several years, irregularities which were not thought very important in December have resulted in serious reductions in rates about the first of January, after which rates declined, so that by February or March they left no profit, and the winter's business became almost valueless. This was the case in the winter of 1878-79, when rates in February at times were among the lowest ever made, and the demoralization continued until August. In the winter of 1879-80 rates were well maintained, and also in 1880-81, except that about February or March reductions were made on large shipments by one company. The winter of 1881-82 began with the railroad war of 1881 at its hottest. Peace was made and some advance in rates ordered Jan. 28, but by that time most of the traffic had been carried at absurdly low rates, and a great part of what was left behind was contracted for at similar rates, while not even a formal advance to 25 cents per 100 lbs. was made until near the end of March. In 1882-83 rates were pretty well maintained through the winter. In 1883-84 there was more or less secret cutting of rates through December, and open reduction to 20 cents (from 30) for ten days in January, a restoration that was not well observed, through January and February, then a reduction to 20 and finally

* See *Railroad Gazette*, page 222, March 21, 1884.

to 15 cents some six weeks before navigation opened. All the efforts to prevent the utter destruction of the profits of the traffic seem to have had little effect, except perhaps last year, when, though rates were irregular all winter, they did not become wholly profitless until about the middle of March, and probably in 1879 also the rapidity of the decline was checked by the efforts made to prevent it. But for the part played by Mr. Fink's organization, the rate may have gone to 15 cents before the end of January, and remained there both in 1879 and 1884. The trouble this year seems to have been exceptionally obstinate, though it has never resulted in open war, rates going down for a week or two or three weeks, then being generally restored, and so fluctuating up and down at frequent intervals. Such a state of things is well calculated to check shipments when the rates are maintained, as experience indicates that the shipper will only have to wait a little to get a material reduction. It also works great injustice to all but steady and regular shippers, who make up for the losses of one week by the gains of another, because the man who has paid 25 cents per 100 lbs. for the carriage of his goods from Chicago to New York has to compete in selling them with the man who a little before or after got his carried for 15 cents.

The most notable feature in the grain receipts at New York during the month of November is the very large amount brought by the West Shore road. The total rail receipts were 21½ per cent. larger than in the previous month, but the receipts of the West Shore were 59 per cent. greater. They were 13½ per cent. of the total rail receipts, while the Lackawanna's were but 7½ and the Pennsylvania's but 11½ per cent. Considering the limited rail connections that the West Shore has west of Buffalo, this is a very large business. It did not have to depend upon the railroads for it, however, as the lake vessels afford grain to any carrier who will bid low enough for it in competition with the canal.

New York rail receipts (grain and flour) in November and for the 10 months previous were:

	November.	—10 mos. to Oct. 31.—
	Bushels.	P. c.
N. Y. Central.	3,215,315	40.5
Erie.	3,683,862	25.0
Penn.	915,939	11.5
Lackawanna.	590,512	7.5
Other roads	1,228,254	15.5
Total by rail.	7,939,882	100.0
	59,330,886	100.0

The "other roads" in 1883 carried less than 150,000 in November, which was more than in any earlier month, and it is safe to say that as much as 1,075,000 bushels of what was received by them in 1884 came by the West Shore, and that it then carried 13½ per cent. of the New York receipts, against 2½ per cent. in the ten months previous. Its ability to carry a large share of the grain is thus proved, and it is probable that it will hereafter remain a formidable competitor for the business. Probably it carried at less than the regular rates to secure so much business, and it cannot do this, now that navigation is closed, without the co-operation of some railroad west of Buffalo.

The large traffic is likely also to have some effect on the "staying power" of the West Shore in its contest with the New York Central. Traffic of this kind it ought to be able to carry at a very low cost, and if the regular rates had been maintained there must have been a considerable profit on its November grain traffic. Rates were not maintained all the time by anybody, but it may very easily be that there was some profit on all this business, which is an important matter when the whole passenger traffic is carried at a loss.

Efforts have been made at Chicago to restore and maintain east-bound through passenger rates, which have not yet succeeded, but are not yet abandoned. There has been at no time so great reductions in these rates as in the rates from New York, and until recently we believe there was no open reduction, though the full price was obtained for but few tickets, a cut of \$4 being general, to \$16. The disagreement of the Chicago railroads is as to the payment of commissions to outside agents. The Chicago & Grand Trunk insists that this is necessary for it, and the other roads declare that commissions so paid always result in a cut to the passenger, and that they must and will meet any such cuts. On the failure of a meeting last week to agree on this point, an open reduction of rates to \$14 was made, New York newspapers have commented on the fact that the Pennsylvania sold tickets at reduced rates as well as the other roads, as if it indicated a change in its policy at New York, where it has refused to sell tickets to Chicago at less than \$20, while the highest open rate by any competitor was not more than \$12, and many tickets were sold at less than \$10. But the circumstances are different at the

two ends of the Pennsylvania's line. At the New York end a \$12 through rate would demoralize the rates on the enormous local traffic of the eastern half of the line; at the Chicago end the local traffic that can be demoralized is comparatively insignificant. It is to preserve the profits on its local business, and not contempt for the through traffic or indifference to a diversion of it, that has led the Pennsylvania to maintain its rates from New York to Chicago. It had more to lose than to gain by meeting the low rates of its competitors. Quite probably it has more to gain than to lose by meeting them at Chicago.

Mr. Pierpont, Vice-Chairman of the Joint Executive Committee, has proposed to the Chicago roads to pool the travel eastward and permit the payment of commissions by the method recently suggested, through the railroad companies' agents and under the direction of the pool authorities, just so great and so long as should be found necessary to cause the traffic to be distributed in the proportions agreed upon. It is difficult to see how anything can be accomplished unless there is some understanding, tacit or open, as to the proportion of business the road should get which has to offer special inducements to secure passengers. If it does not interfere much with the business of other roads, they are not likely to find fault, however great the commission and to whomsoever paid. The question with them is, how much of the business is it getting; this they will not know exactly unless there is some agreement, and their ideas of what is the Grand Trunk's "fair share" are likely to differ from the Grand Trunk's ideas, so that they are almost sure to make reprisals when the Grand Trunk thinks it is only beginning to get its share.

We had not heard of Chicago as a sheep-growing town, and in fact should hardly have dared to suggest that any herbivorous animal could find pasture there. But the Chicago Board of Trade figures, which of course can never lie, indicate that Chicago produces more wool than any ranch of equal extent in New Mexico or Australia. Its reports show that for the last four years the aggregate receipts of wool at Chicago have been 164,306,089 lbs. and the shipments 189,861,146 lbs., showing the Chicago production for the four years to have been 25,555,057, or about 6,400,000 lbs. a year. More than a million of very superior sheep must find pasture in the Chicago streets to produce all this wool, and sheep shearing must be an important industry there. From sundry reports from time to time the impression has prevailed that only lambs were shorn there. If so, there must be more even than a million of them, or the fleeces which they lose there are extraordinarily large.

The managers of a joint-stock company in France were recently prosecuted criminally, charged with declaring a fictitious dividend. A law of France passed in 1867, as also a law of Belgium, passed in 1873, provides punishment for paying dividends made without taking an inventory, or based on a fraudulent inventory. In the case in question a company was formed with a capital of 500,000 francs, authorized to increase this capital to 10,000,000 francs. By successive issues the capital was actually raised to 5,000,000 within five months, but between the two issues dividends were declared. Complaint was made that the dividends were fictitious. The court soon decided that there were no profits that could be divided legitimately, and then it took up the question of the "good faith" of the directors, whether they were not themselves misinformed or mistaken as to the position of the company. The court found that the accounts accessible to the directors were sufficient to make them understand the true condition of the company, and that it was not reasonable to suppose that they did not understand it. The court thereupon found the directors guilty and sentenced them to imprisonment.

French law and justice of this kind would have saved certain railroad investors many millions of dollars in this country within the last ten years, and checked the activity of some of our great financiers.

Surprise is expressed that there have been so few applications from this country for space at the International Exhibition of Inventions to be opened in London next May. The President recommended to Congress to provide for a government commission to take charge of the American exhibits, but it has not done so, and as applications for space will not be received after this month, no government action now is likely to have any effect in increasing our representation at the exhibition. But our inventors ought not to need that aid. They usually are able to take pretty good care of their own interests, and a great many of them, it would seem, can expect decided benefit from such an opportunity to show their devices. The time for

application was to close Dec. 31, but at the instance of Mr. Pierpont Edwards, British Consul at New York, the time has been extended for a month. Further to assist intending exhibitors, Mr. Edwards is prepared to give intending exhibitors all the preliminary information required, directions for making application for space, and official application blanks.

The Cost of Rear Collisions.

Mr. Archimedes Stephenson Watt protests, in the *Railroad Gazette* of Jan. 9, against our estimates of the cost of these disasters in the month of October; and, we suspect with an obscure satire, suggests that we procure accurate statistics from those who are suffering from them, or that we shall station reporters to give us estimates approaching accuracy.

We believe it might prove a valuable service to the railroads if they were to furnish accurate accounts of the cost of these occurrences, not necessarily for detailed publication; until such authoritative statements are obtainable, we shall maintain that our rude estimates are not far from a just average, although rather under than above it. Besides, it really does not matter much in the argument, whether the cost of equipping all the roads with starting signals, or semaphores, would be recovered in 20 months, as we have estimated, or in a longer period; the advantages to be derived from putting an end to these constantly recurring rear collisions would be considerable enough, even though our estimate prove too high. We are confident, however, that this is, on the contrary, too low, taking the year through, or one year with another.

For instance, our account of "Train Accidents in November" enumerates 15 tail-enders out of 30 rear collisions, whereas we had 17 out of 29 in October, but there were 5 persons killed and 85 cars destroyed, against 4 persons killed and 82 cars destroyed in October; so taking the figures used in our estimate for October, the average cost of each accident would be something over \$4,000, instead of \$3,530, as we had estimated for the first month.

There was a time when these occurrences were regarded somewhat as a matter of course by an indulgent public; perhaps sympathy with the flagman had a good deal to do with this feeling; it was felt that men called upon to flag following trains must sometimes fail; and upon the supposition that there was no better mode of controlling the trains, the railroads escaped condemnation. Many a capable railroad manager could then testify that he knew of no better way; he had never known of any other having been tried. He would not now be in a similar state of knowledge if called into court; he would probably be compelled reluctantly to admit that only the unwillingness of his company to make the necessary expenditure had led him to do without signals so long.

It is certainly worthy of consideration by railroad companies whether they can with impunity continue to destroy property and, as we see monthly, human lives, in collisions which are clearly preventable by simple means, as has been abundantly shown by the experience of several of our best American railroads. There are instances of rear collisions upon roads which have signals in use, but they do not occur when the signals have been judiciously located, properly used and promptly obeyed; they only make it plain how much is effected by the use of signals in the immense multitude of instances when they are rightly used and heeded.

It does not require demonstration that if an interval of distance, say three or five miles long, is maintained between trains, they cannot possibly collide; and such an interval may be maintained in the most positive manner by the use of the telegraph and signals; and, as we have shown, for an insignificant addition to the expenses.

November Earnings of the Chicago, Burlington & Quincy Railroad.

The earnings of this road in November last show an exceptionally large decrease, not only from the corresponding week of 1883, but also from the previous month of 1884. There is always a decrease from October to November, but it has never been so large before. The amount by which the November receipts have been less than the October receipt has been in successive years:

1880.	1881.	1882.	1883.	1884.
\$96,838	\$214,868	\$80,623	\$179,706	\$449,706

The decrease was 17 per cent. this year, against less than 7 per cent. last year. The reasons for so great change, so far as known, are a through passenger rate of \$1 from Chicago to Missouri River points (against a regular rate of \$14.50), a lumber rate of 5 cents, against a regular rate of 15 to 18 cents; the lack of corn to carry, the old crops having been marketed and the new one not yet fit to ship; and, probably, the cessation of the heavy wheat shipments from Kansas, Nebraska and Iowa, the bulk of the crops having been marketed before November, or the shipments having been checked then by a fall in prices.

The gross and net earnings and working expenses of this road in November have been, for five years:

Year.	Miles.	Gross earnings.	Expenses.	Net earnings.
1880.	2,713	\$1,837,860	\$828,206	\$979,654
1881.	3,108	1,816,133	912,980	903,153
1882.	2,239	2,190,421	830,559	1,360,862
1883.	3,284	2,562,774	1,074,709	1,488,065
1884.	3,400	2,233,891	1,088,845	1,145,046

Compared with 1883 the changes are:

Gross earn.	Expenses.	Net earn.
Amount ... Dec. \$326,893	Inc. \$14,133	Dec. \$312,019

Per cent ... 12.8 1.4 23.0

The decrease is large in gross earnings and very large in net, there being no decrease in expenses.

Compared with 1882 there is a small increase in gross

earnings (2 per cent.), but the increase in expenses is so great that there is a decrease of \$185,816 (14 per cent.) in net earnings. The increase in mileage is moderate (7 per cent.) since 1881, but it is large (25 per cent.) since 1882.

For the 11 months ending with November, this company's earnings and expenses have been :

Year.	Gross earnings.	Expenses.	Net earnings.
1880	\$18,902,475	\$8,481,493	\$10,220,982
1881	10,270,965	9,703,162	9,567,803
1882	19,514,744	9,892,698	9,622,046
1883	23,939,451	11,781,502	12,157,949
1884	23,423,313	12,036,228	11,367,085

Compared with 1883 the changes are :

Year.	Gross earn.	Expenses.	Net earn.
Amount.	Dec. \$516,138	Inc. 274,726	Dec. 790,864
Per cent.	2.2	2.3	6.5

The decrease in gross earnings is a small proportion of the whole, and would not be significant but that five-eighths of it occurred in the last month of the eleven. There was, in fact, an increase of \$73,683 in the first eight months of the year, while in the three fall months there was a decrease of \$589,821, or 7 per cent. A large part of the decrease in net earnings, however, occurred before August, there having been gains in August and September, and only a small loss in October.

There is good reason to suppose that November was an exceptionally unfavorable month, though December was not in all respects a good one. But there was less waste of money by railroad wars then. Under the circumstances we should naturally expect a great corn and hog movement over this, the greatest of the corn and hog roads, in January, but it does not seem to have begun yet. A favorable turn may be expected, however, in no very long time.

December Earnings.

The reports of earnings in December so far received are not all so discouraging as those for November, which is sometimes due to the earnings having been unusually small in December in 1883. This is the case with the Chicago & Northwestern, whose earnings in December have been :

1880.	1881.	1882.	1883.	1884.
\$1,472,902	\$1,855,476	\$1,826,929	\$1,760,576	\$1,922,700

Thus the increase over 1883 is \$162,124, but over 1882 it is only \$95,771, and over 1881 only \$67,224. The earnings are, however, larger than in any other December, and in every other month since April it has suffered a decrease, both from the earnings of 1883 and from those of 1882.

The Chicago, Milwaukee & St. Paul makes but a slight gain over 1883, but its earnings were not exceptionally small then. Ever since July this road has shown monthly earnings nearly the same as in 1883, the changes either way being small—a loss of \$25,000 in August, a gain of \$19,700 in September, a gain of \$8,000 in October, a loss of \$79,700 in November, and now a gain of \$70,000 in December.

The St. Paul & Omaha has the same December earnings in 1884 as in 1883, and more than in any previous year. It lost \$44,000 in November and \$48,000 in October, and for four months previous lost about \$43,000.

Farther northwest, the St. Paul & Manitoba shows a continuance of the gains which it has had since September, the gain in December over 1883 being 17 per cent. The Northern Pacific, on the other hand, has a decrease of \$116,605 (14 per cent.), against a loss of \$160,831 (13 per cent.) in November. December was the first month that the new route to Oregon, via the Union Pacific, was open, and this must have had some effect on Northern Pacific earnings. The Canadian Pacific has a large gain, but not nearly in proportion to mileage, and its earnings per mile were only about \$170—probably most of them on its Ontario lines.

Coming farther south we have an increase of more than 10 per cent. on the Burlington, Cedar Rapids & Northern, which had a decrease of 11 per cent. in November and one of 9 per cent. in October, and some decrease in every month but one since May. The Central Iowa had a small gain in December, a very large loss in November, and large gains in October and September.

The total of the Illinois Central's lines, extending from Sioux City and Chicago to New Orleans, increased 3½ per cent., after a decrease, and often a large decrease, in every other month since May. The Chicago & Alton shows a larger decrease than in any previous month of the year, but it is small in comparison with what many roads are suffering, amounting to but \$57,302 (7½ per cent.). The St. Louis & San Francisco, which had made very large gains previous to November, and gained slightly in that month, shows a decrease of 7 per cent. in December.

On the whole, the earnings, so far as reported, are less unfavorable than in the earlier months.

Some idea may be had of the losses to the country by the light corn crops of late years, by the great decrease in our exports of hog products. For the 11 months ending with November these have been for eight years, in millions of pounds :

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
639.1	1,006.1	1,063.5	1,178.6	926.0	569.9	681.3	535.2

Thus the exports in 1884 were even a sixth less than in 1877, and were 54½ per cent. less than in 1880, and 21½ per cent. less than in 1883.

For the last four years the value of these exports has been:

1881.	1882.	1883.	1884.
\$85,845,256	\$61,741,430	\$70,424,409	\$51,435,747

—a decrease in 1884 of 27 per cent. since 1883 and of 40 per cent. since 1881.

Nor has there been, as might have been supposed, an increase in the exports of beef and other cattle products. On the contrary, these have decreased, though not much compared with the hog product. For four years these cattle

products (including butter and cheese) have been for the eleven months:

	1881.	1882.	1883.	1884.
Pounds.	345,648,970	224,253,961	322,237,537	308,618,579
Value.	\$34,499,836	\$23,221,562	\$36,466,953	\$33,297,537

The decrease in quantity since 1881 is about 10 per cent., but in value only 3 per cent. The decrease in quantity from 1883 is chiefly salt beef.

The large crop of corn is going to enable us soon to supply more provisions for export than in any recent year, and may lay the foundation for another great growth of that business, though with the present condition of industry in Europe we must sell meat very cheap in order to have any great foreign consumption of it.

Chicago through rail shipments eastward for the week ending Jan. 2, and for each of the two weeks previous, have been, in tons :

	Dec. 20.	Dec. 27.	Jan. 3.
Flour.	11,861	8,122	9,394
Grain.	26,845	16,938	19,362
Provisions.	14,326	9,324	10,648
Total.	53,032	34,384	39,404

The holidays may have reduced shipments in the last two weeks, though the shipments of the last week of December and the first week of January have not infrequently been among the largest of the year. Last year, however, they were very small—smaller than this year.

The percentages carried by each road in each of the last six weeks are given below, the local as well as through freight included in the first three of these weeks.

	Nov.	Dec.	Dec.	Dec.	Dec.	Jan.
Chic. & Grand T.	8.4	14.1	15.4	20.2	15.5	20.4
Michigan Central.	27.3	24.8	24.0	24.3	22.5	20.0
Lake Shore.	20.4	7.5	13.9	11.6	11.7	14.5
Nickel Plate.	14.6	12.7	13.9	9.2	17.2	11.5
Ft. Wayne.	9.7	18.6	12.0	14.4	13.4	15.5
C. St. L. & P.	4.4	6.9	4.9	7.2	6.0	6.3
Baltimore & Ohio.	2.2	6.4	5.6	7.4	9.2	7.2
Chicago & Atlantic.	12.0	9.0	10.3	5.7	4.0	5.1
Total.	100.0	100.0	100.0	100.0	100.0	100.0

The Grand Trunk again takes an exceptionally large proportion, and the Michigan Central has a smaller one than heretofore, both tending to an adjustment. The Chicago & Atlantic, which is perhaps further behind in the pool than any other road, had not half its share and so increased its shortage.

The Chicago & Grand Trunk carried 31½ per cent. of the provisions and 23½ per cent. of the flour, but only 12½ per cent. of the grain. The two Pennsylvania roads together carried 20½ per cent. of the provisions, or less than the Chicago & Grand Trunk alone.

There has been a very great decrease in the wheat receipts of the Atlantic ports since lake and canal navigation closed, perhaps chiefly due to the closing of navigation, though there has been some decrease at other ports than New York. The average weekly receipts were 2,360,000 bushels in October, and 1,820,000 in November, being 1,744,000 in the last week of November. For the next four weeks they have been:

	Av. in Nov.	Dec. 6.	Dec. 13.	Dec. 20.	Dec. 27.
At New York.	1,230,055	301,125	150,150	136,500	138,750
Elsewhere.	590,000	673,043	412,593	480,584	378,691

For the last two weeks the New York receipts have been but one-ninth of the November average, while the decrease at the other Atlantic ports has been comparatively small. The flour receipts, however, have kept up very well, and by far the larger part of these were at New York and Boston since as well or before navigation closed.

Taking all grains together, New York had 60 per cent. or more of the total seaboard receipts in every fall month, and 64½ in November, but its proportion after the first week of December fell to about 35 per cent.

The Chicago Tribune estimates that the value of the produce received there, including little except products of the soil, and primary manufactures from them, like flour and provisions, has been as follows for eight years, in millions of dollars :

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
203	218	253	312	367	382	400	356

The value in 1884 was thus 11 per cent. less than in 1883, and less than in any other year since 1880, but 75 per cent. more than in 1877 and 40 per cent. more than in 1879. The weight of this produce, in tons, is given as follows :

1881.	1882.	1883.	1884.
6,200,000	5,400,000	6,935,000	6,800,000

There is no other place in the country, except New York, where there is anything like these receipts of farm produce.

The number of live cattle brought to New York city last year was less than in any other year since 1879, having been for eight years

Year.	Number.	Year.	Number.
1877	507,832	1881	683,558
1878	543,587	1882	639,408
1879	575,159	1883	672,945
1880	679,987	1884	609,263

This decrease is doubtless due to the larger consumption of beef slaughtered in the West and brought to New York in refrigerator cars, which last year amounted to about 120,000 carcasses, and to a decrease in exports, which have been considerable in several years. For six years the exports have been:

1879.	1880.	1881.	1882.	1883.	1884.
33,295	85,400	38,923	18,939	67,964	50,105
Dressed.	72,029	79,115	71,825	55,603	66,040

Total.... 103,324 164,521 110,748 74,542 104,004 153,594

The exports were about one-fourth of the arrivals last

year, a little less than a fourth in 1883, one-ninth in 1882, and 24 per cent. in 1880.

The price of rails in this country reached a lower point in 1884 than ever before. Quotations at Philadelphia were \$32.50 per ton at the beginning of the year, but the price fell very soon to \$30, and in August sales were made at \$26. Afterward there was some advance, and at the close of the year \$28 to \$28.50 was the price. Previous to 1879, when prices were lowest, they were but little less than \$40. At current prices rails have become but an insignificant part

This was not so important when the first freight lines were established as it has since become; but any other mode of using cars is now the occasion for an excessive movement of empty cars from place to place, in order to find appropriate loads.

When cars are in great demand upon a large system of roads, they can only be judiciously distributed by one person, who commands a complete view of the equipment available at all parts of the system, and the wants of all. Such a view may be had by properly arranged telegraphic reports from each station to its division headquarters, and from all the divisions in a condensed form, to the central office. By the use of blanks in which every kind of car in each line is designated by a different letter of the alphabet, the numbers of all kinds at each station, and the number required to be loaded at each, may be indicated by a few symbols; and the report may be ready at an early hour, to permit the distribution to be made, by orders from the central office to division headquarters, and from them to stations.

An examination of the reports of the great railways will show results something like this: number of tons moved per car in a year, from 500 to 600, or about $1\frac{1}{2}$ tons per day; or say 10 days for each car-load of 15 tons; yet, as the average car-load has probably not reached that weight on any road, the journeys are somewhat more frequent than this would indicate. The average movement per car per day is found to be, upon active roads, for the year about 36 miles, varying with the several classes of cars from 12 miles to 80; the most rapid movement taking place in stock cars; next in line cars, and after that in local cars, which do not leave the road. The delays to local cars, especially to those which handle coarse materials, as lime, coal and lumber, are notorious and shameful; they result in great loss of traffic to the roads, because the equipment is not generally sufficient for the demand, and in injury to shippers and consignees who are not, in consequence, promptly served; evidently the remedy is not in providing more cars, but in compelling them to be promptly loaded and unloaded. So far the supposed necessities of competition have prevented any general adoption of a charge for the delay of cars by failure of consignees to unload; or when such a charge has been adopted, it has not been enforced long enough to have any permanent effect; but it has been frequently proved that a moderate charge, say 50 cents a day for all delays over 24 hours, sufficed to insure quick unloading, when it has been strictly enforced; for business men are not indifferent to their interests, and will exert themselves to avoid any unnecessary tax. Experience has demonstrated, however, that as the freight departments of most railways are organized, as if for the sole purpose of obtaining traffic without regard to revenue, it will not be possible to collect this tax through the ordinary agencies. The superintendent's department will be the most likely to see it laid on without fear or favor, for it is that one which finds itself imposed upon by the delays of shippers and consignees. It ought not to need much argument to convince all departments, that it would be better to lose the traffic by which the cars are delayed, if thereby the cars can make more frequent trips with other traffic, which is awaiting means of transport.

The delay of cars when on foreign roads has been one of the sorest grievances of which the railways have had to complain to each other, for which no adequate remedy has been found. It has been ably treated of in papers by Mr. W. P. Shinn, before the American Society of Civil Engineers, and discussed by persons of experience; those who wish to study the subject in detail are referred to this discussion. Probably there is no better remedy, in the present condition of roads and of traffic, than would be afforded by the simple expedient of reporting the mileage and actual position of each car upon every road to its owners. This would often enable the owners to provide loads homeward, instead of having the car wait idly for a load to turn up, or for the convenience of the other roads to return it empty. Nothing seems more reasonable than that a road should demand such information as to the whereabouts of its cars; the experiment of making such reports has been tried and found to be easy, valuable, and not too costly.

Akin to the loss from delays of cars is that unknown but immense deficiency in revenue from not weighing the loads which they carry—a loss which is not felt, because it is not known until weighing is resorted to, but which may as reasonably be neglected in the transactions between a grocer and his customers as between a railway and its shippers. The cost of track-scales has often been pleaded in extenuation of a neglect to provide them; but where the traffic amounts to ten cars per day, experience shows that the gain to revenue may be reckoned upon to repay the cost of scales in a year. It is not necessary to have track-scales at all stations, because cars may be weighed at junctions and termini; it is insisted that the weight carried should always be accurately known and charged for. The only party who suffers by a car-load rate is the railway company.

There are few stations in the older parts of the country at which the business would not be increased by the erection of a good crane or derrick, for many shipments which are almost impossible, or are undertaken with great hesitation where there is none, would be rendered easy if such a convenience were at hand; the saving of delays in loading and unloading from its use would also be considerable; the neglect to provide cranes at the larger stations is not excusable from the fact that it has not become customary, for there are always masses of stone, iron and machinery awaiting shipment or unloading at such places, which cannot be handled economically without the aid of a hoisting machine. If thought best, no doubt a slight charge would be cheerfully

borne by patrons for the use of it, yet the benefits to be derived by the company from its employment would be a sufficient return upon its cost.

It is to be regretted that charges upon freights are not divided, so as to show how much is for transportation, how much for handling, and what part is for the use of the stations or terminals. It can scarcely be doubted that such a division would be of advantage to the railway company, for the justice of the aggregate of small charges would be more readily appreciated than is a gross sum per hundred, or even than a rate per ton per mile. These last methods of calculating rates must be very deceptive even to experienced transportation men, because they must be applied for various distances, to different articles destined to points at which facilities and expenses vary widely. At any station, it is probable that the cost of handling one class of freight will be per ton five times as great as that of another class; and that there will be other classes of which the terminals cost will lie all the way between these extremes.

Although these differences are not shown in the tariffs nor explained to shippers, it is very important that they shall be accurately known to those who make the rates, and duly considered by them. Among the few terminal charges which are now collected as separate items, the most important are those for switching; that is, for placing cars to be loaded or unloaded on private sidings, or on the sidings of other lines; at great stations this is a source of large revenue, if properly attended to. It is often, in our railway practice, left to the option of the agent at the station whether to make the charge or not; and sometimes there is no check upon his collections, and he reports to the treasurer such a sum as he pleases on account of switching. Such methods need reformation.

On long roads, the frequent breaking up of trains at the division termini and re assorting of the cars is a source of great expense, to reduce which it is worth while to expend much labor and to endure some delay, especially to freights which are not of a perishable character. Each time that a car is shunted it runs some risk of injury, especially to its draught irons and brakes; perhaps one-third or one-quarter of the repairs of freight cars is due to damage in shunting. The mileage of switching engines is not known; it is usually estimated at six miles per hour, at which rate the aggregate is about half as much as the whole mileage of engines upon freight trains. The amount of violent exercise to which the cars are subject, in consequence of this, can only be realized by those who are familiar with the operations of a terminal yard upon a dark and stormy night. Of course, if this switching is avoided, not only the damage to cars is less, but the number of engines and of yardmen may be correspondingly reduced. A great deal may be done to lessen the breaking up of trains, by making up solid trains for through and division points at termini and important junctions, and by starting trains out with the cars in the order in which they are to be left, if any are to be dropped on the way. It will require systematic effort, patience and the co-operation of many persons to accomplish great results in this, but success in it will benefit the railway company correspondingly.

The cost of hauling a train through a division is made up of items which do not vary with the number of cars taken or the tons hauled, to an appreciable extent; only the quantity of fuel and of water consumed by the engine are affected enough, by any difference in the load, to make that difference perceptible. It is, therefore, a ready means of reducing the cost of transportation to increase the loads taken by the engines, if they can be increased, as on many roads they can. The number of cars may often be augmented upon the whole length of a division, except at some limiting grade, at which it will be advisable to station a helping engine, if the traffic is sufficient to justify it, which may be easily determined by a calculation; or a part of the train may be left upon a siding at the foot of the grade, to be returned for by the engine when the other part of the train has been taken to the summit. Such additions to the work done will be resisted by the employés concerned, and even by officers, because of the trouble involved; the employés frequently object because the number of trips required and therefore the number of men employed are thereby reduced; yet, as these objections are not well founded, they always yield to a persistent determination. Where the nature of the country and the volume of traffic will admit of it, the best mode of overcoming the limiting grade is by a reconstruction of the line, reducing the grade. This has been done very profitably upon many of the older railways.

When the movement of freight is obstructed upon a great road, in consequence of some great storm or disaster, the accumulation of cars, if the traffic is at its height, may become almost appalling to those who are charged with the duty of forwarding them to destination. The blockade is sometimes rendered much worse than it need be by injudicious efforts to "rush things."

The amount of traffic which can be passed through a division yard in a given time is often the limiting consideration; and, generally, such yards will admit of useful work by only a certain number of switching engines. It will therefore be impossible to take care of more than a determined number of trains at once; to allow more than that number to enter the yard would result in hindering the operations of the yard-men and cause delay instead of hastening the movement. The chief duty of a superintendent, then, will be to keep all trains under control, so as to prevent any blockade at any point. The zeal of yard-men and of train dispatchers at the termini is apt to be quite sufficient to hasten the departure of trains in as rapid succession as the power at command will admit of. When the trains have reached the next division yard, their responsibility for them is ended. There must be some one in control of the

whole movement, who will arrest it from either direction when it is too rapid. The worst blockades have resulted from overcrowding, in consequence of a want of coolness or of firmness on the part of the superintendent or manager, who will be beset at such times not only by the troubles incident to the movement of trains, but by the clamors of the shippers and consignees, aided probably by the officers and employés of other departments. If he loses his head, or yields a hair beyond his deliberate judgment, he may be lost; he must keep cool and trust to the successful unravelling of the snarl to be his vindication. The attempt to move too much traffic in a given time is likely to involve also destruction of engines and cars; the employés, being hurried and overworked, use less than common prudence, when the circumstances really demand more than usual caution to avoid collisions.

The small obstacles to the prompt movement of freight are too many to be recited, and they will differ upon every line and at every point upon it. They can only be discovered by the patient investigation of every complaint, and they can generally be removed when their cause is understood. Instead of regarding complaints as an annoyance, the judicious manager will look upon them as a help to improve his administration. He may be quite certain that they are not nearly so numerous as would be for his advantage—for there are only a few persons who are active-minded enough to write down their griefs; a very large majority only curse the road or its management for what they presume to be shameful indifference. It will be found that agents, who have been carefully instructed by circular, have not read the circular; that they lost their copy, or if they read it, they put a construction upon it which no other person, certainly not the author of it, could have entertained. Misunderstandings of this kind, wholly inconceivable until traced out, will account for a very large proportion of the miscarriages of freight. The "capacity of the human mind to resist information" is in nothing more thoroughly demonstrated than in this matter of forwarding freight.

CHARLES Paine.

The Electric Cab Signal.

The Electric Cab Signal Company's method of signaling railroads and operating the gates of highway crossing is now in use on the Staten Island Railroad. The signals are given in a manner which widely differs from that used in any system now in general use. Instead of visible signals, placed near the track, the engineer is warned of danger by a whistle sounded in the cab. The advantage in a fog of an audible instead of a visible signal is obvious.

The means by which the signal is operated in the cab are simple. A dynamo on the engine generates a current which traverses a circuit formed in part by the rails. The current passes to the tender, thence to the tender wheels, through the rails to the engine wheels, and thence back to the point it started from on the engine. Any want of continuity in the rails between the engines necessarily breaks the circuit.

A signalman breaking the circuit, or an open switch automatically warns the engineer of danger by interrupting the rail circuit.

Highway crossing gates can also be lowered across the highway when a train approaches within a definite distance. The actual work necessary to raise the weight of the gate is performed by a treadle which is pressed down by the wheels of the engine. Any interruption to the circuit releases an armature in the cab, and allows a spring to move a cock admitting steam to a small whistle, which continues to sound until stopped by the engineer. The system is so arranged that a danger signal can be given by an ingenious mechanism more easily understood on inspection than described, the engine wheels simply placing a heavy weight in a position ready to lift the gate, but do not actually lift the gate. A catch holding the weight is released by electricity, and the movement of the weight lifts the gate when the tail of the train has passed. Thus the movements of the gate are regulated by electricity, while the work of overcoming the friction and weight of the gate is performed by the engine wheels acting on a treadle placed beside the rail.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Boston & Albany, annual meeting, at the Meionan in Boston, at 11 a. m., Feb. 11.

Buffalo, New York & Philadelphia, annual meeting, at the office in Philadelphia, Jan. 12, at noon.

Connecticut River, annual meeting, at the office in Springfield, Mass., Jan. 21, at noon.

Fitchburg, annual meeting, at the passenger station in Boston, at 11 a. m., on Jan. 27.

Lehigh Valley, annual meeting, at the office in Philadelphia, Jan. 20, at noon.

New York, New Haven & Hartford, annual meeting, at Loomis' Temple of Music in New Haven, Conn., at 11 a. m., on Jan. 14.

Philadelphia & Reading, annual meeting, at the office in Philadelphia, Jan. 12. The registry of stock closed Oct. 12.

Pittsburgh & Lake Erie, annual meeting, in Pittsburgh, Jan. 12, at noon.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atchison, Topeka & Santa Fe, 1 $\frac{1}{2}$ per cent., quarterly, payable Feb. 16 to stockholders of record on Jan. 10.



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE USE AND ABUSE OF TOPOGRAPHY.

In reading the many letters called out by a query in the *Railroad Gazette* of Nov. 5—the twelfth is published this week—one is reminded of the old fable of the two knights who fell to fighting over the shield which seemed gold or silver according to the “point of view”; for the question under discussion is also one with two sides to it, both of which are important and equally true. It is only by losing sight of one side or the other that one becomes a strong partisan of either.

The difference between the two views, in fact, is more imaginary than real. On the one hand, there are no engineers of any standing or experience who believe that location offering any difficulties can be made to advantage in any other way than from topographical notes embodied in a more or less elaborate topographical map; while on the other hand, there are no engineers of experience who would think of claiming that more topography than is really necessary for intelligently completing the location, and making sure that it is correct, should be taken.

The true difference between the two sides, therefore, is simply *how much topography* should be taken, and where the line should be drawn. There is no such difference of opinion as would appear from an error into which one or two correspondents have fallen—an error which well shows how completely the views of those who take one side of this question are misapprehended by those who think they disagree with them;—that is to say, there is no class of engineers who attempt to make a final location assisted by the natural eyesight alone, or in any other way than by working from a preliminary line as a basis, which is intended to lie, and if skillfully run does lie, very close to the line on which the final location is placed.

To mark the limits of the debatable ground as closely as possible, there is probably no one who will question (1) that in proportion to the skill of the engineer this preliminary line (often at difficult points necessarily the result of two or three trials) will approximate more and more closely to where the final location will ultimately lie; (2) that it should and in general will lie nearer than the 300 or 400 ft. spoken of by our last correspondent; (3) that the placing of this preliminary line upon the ground is and must be purely a matter of individual “eye for country” and good judgment, and (4) that the really vital and dangerous errors of location, the selection of the general route, the system of gradients, the going to or passing by the local towns, etc., etc., are committed, if committed at all, before any topography whatever has been taken, in locating this preliminary

line; the usefulness of the topography beginning only after the more momentous question of *where to put preliminary* has been decided, and serving only for the more ready and perfect adjustment of details—details which have an important effect upon the cost of construction, indeed, but do not otherwise seriously modify the earning capacity of the line.

The remaining ground for difference between extreme advocates of either side is this: The extreme believer in topography is indifferent to getting his preliminary very near to his ultimate location, looking upon 400 or 500 ft. average distance apart as near enough (as our correspondent implies in another column, but probably without intention), and takes or causes to be taken a wide belt of accurate topography to save the need of a new or a better preliminary. But the advocates of the other view say, “No; the engineer who can be trusted to put a preliminary line within even 500 ft. of the true location can and ought to, in general, put it much nearer; or if not, it is cheaper to put a new line through still closer to the ultimate location than to take so wide a belt of topography. By one method or the other the good engineer can and will bring the line so near to where his location should lie, that the topography which he will really need will be only a very narrow belt, usually no more than a few series of cross-sections and hardly amounting to a topographical map at all.”

The truth seems to lie somewhere between these two limits. Since the amount of topography ultimately needed and used (when its use is not abused by making it serve as a substitute for the careful placing of the preliminary) can be seen on any map to be very little, no one will deny that covering a map all over with accurate topography is a sign of weakness and not of strength. On the other hand, every one who has tried it knows that accurate topographical contour lines for a reasonable and moderate distance on each side of the line are an immense assistance for the ready projection of lines, and at points can hardly be dispensed with. It is also an important truth that the usefulness of topography is not confined simply to that portion used to project the line adopted, but extends also to the portion which enables one to make sure that no other and better alignment might have been adopted. However confident an engineer may feel that he has in fact studied his work to the best of his ability, he owes it to himself and to his employers to have the ocular evidence of that fact before him, to be placed before others if need be, and it is but reasonable that no study of the ground alone, unassisted by accurate maps, can be as complete as one which has been so assisted. Yet on the other hand it is doubtless even more emphatically true that no study of maps alone, unassisted by study of the ground in detail, both before and after the making of the maps, can be as complete as it should be.

Most of those even who are strong believers in the proper use of contour maps will disapprove of such elaborate reliance upon maps alone as our last correspondent seems (but perhaps only seems) to advocate; taking the nicest precautions for computing notes for 10 miles of location at once, so that it shall fit *geometrically* on to the preliminary and so dispense with renewed and more detailed study of the ground. Not but that the field work and mapping might be done so accurately that this would be all that would be necessary, and not but that much of a location so made may prove on examination to be beyond improvement, at least by the same engineer; but that for several practical reasons it seems inexpedient to rely so largely upon paper location. Among these are:

1, and most important, the length and depth of cuttings and especially the classification do not impress themselves upon the mind so forcibly in studying a topographical map as in studying the ground, and hence as great efforts will not be made, practically, to avoid this danger when the principal study of the details of the line is made upon the maps as when the paper location is looked upon as at best nothing more than a close approximation, and the last study of the ground is made with the rock cut staring one in the face or on large scale cross sections.

2. A very dangerous error, which the best engineers find it hard to avoid altogether, is especially hard to avoid in making paper locations, which is, to regard a certain *horizontal approximation to the grade points* as about the proper thing, thus leading to altogether too much curvature and respect for the contours in easy country, and altogether too little of both at the more difficult points. The watchful engineer finds himself drifting into this error continually, guard against it as he will. It results in part from a natural, but evidently erroneous, tendency to look on a certain percentage of decrease of curvature, for example, as worth a certain percentage of increase in the work, instead of being merely worth a certain absolute sum,

which on easy work justifies great disregard of contours and on heavy work requires close accordance with them.

3. The best topographical maps which it is either expedient or, in general, possible to make, with the time, labor and cost of making, cost to be paid within a foot, or even 5 or 10 ft., at critical points, especially over any such width as 500 ft., on each side. Over most of their area, if well made, they will be trustworthy, but minor irregularities of considerable importance, if nothing more than a few big boulders, get smoothed out of the map or misplaced or exaggerated, so that the only safe rule is to look on the first location, however carefully studied, as still open to much improvement,—an expectation which will rarely be disappointed. But if frequent minor changes are to be made, much of the advantage of computing a first location so precisely on paper is lost.

4. To run in long stretches of location successfully without further topographical tests, but only the geometrical test of a “tie” to a preliminary, requires the nicest field and office work from the beginning to the end of the survey. It is, of course, only a question of degree. No one would advocate anything but good work of the kind, but it is obvious that less precision is required, if it is fully understood and expected that the paper location will be topographically tested throughout, than if it is expected to be, in the main, a finality. But this saving of needed precision means some corresponding saving of time and money which, as Mark Twain said of his profanity, “can then all be saved and devoted to some other end, where it will do more real and lasting good.”

The “conclusion of the whole matter” would therefore seem to be that accurate topography for a certain narrow strip is a highly useful adjunct to practical location, which should never be omitted altogether and should generally be very carefully taken and studied, but that it is in no way a safeguard against anything but minor errors of location and is not a safe, or at least expedient, reliance for giving the last degree of perfection even to the details of alignment. Great differences in natural aptitude for location exist, and among the strongest believers in the absolute necessity of elaborate topography may well be some who have less of this natural aptitude and hence will not make very good use of the best of maps, while on the other hand those who have or think they have such aptitude may be led thereby to be over confident and commit errors which good topography would reveal to them.

But another truth should not be forgotten. It is easier to put a line of some kind or other, on a topographical map than on the ground; but to do the best that the ground admits is almost as hard, and takes almost as much study and skill, on the contour map as on the ground. This the inexperienced projector, of good natural parts, will soon find out if after having put in a paper location, which he thinks is very good, he will start in over again on the assumption that it is all very bad, and give two or three times more thought and care than before to finding out wherein it is bad. He will probably soon be satisfied that his assumption was correct, by finding his curvature and quantities simultaneously diminishing.

There are, of course, extremes of country, both easy and difficult, to which nothing that has been said here, or presumably in our correspondents’ letters, has been intended to apply. On nearly flat country, contour maps are neither possible nor needed. On the other hand we have in mind a locality where anything like an attempt to run a line as a guide to location would have been ridiculous, and nothing less than a thorough topographical study of an area about as broad as it was long was of any avail.

GRAIN RATES FOR TWENTY YEARS.

It was about the year 1872, we believe, that we first endeavored to collect some records of the history of freight rates between Chicago and the seaboard. It was only with great difficulty that any records could be found extending more than a few years back. The Chicago fire had destroyed what may have been there, but it appeared that railroad officers were not in the habit of preserving rate sheets long, and no one seemed to know where to find the information desired.

Fortunately a file was found preserved in the office of the General Freight Agent of the Lake Shore & Michigan Southern Railway at Cleveland, going back to 1864, from which we compiled a history of the changes. Recently Mr. C. W. Bullen, Secretary of the Joint Executive Committee, has supplemented these records by completing them down to date, and we are thus able to present all the recorded changes in the grain rate from Chicago to New York since

March, 1864—nearly 21 years, which are given in the accompanying table:

Chicago-New York Grain Rates for 20 Years.

(In cents per 100 lbs.)

Date.	Rate.	Date.	Rate.	Date.	Rate.
1864: Jan. 1	100	1869: Jan. 1	75	1877: Jan. 1	88
April 4: 90	100	Jan. 25: 70	100	Jan. 2: 35	35
April 12: 80	100	May 11: 50	100	April 2: 30	30
April 14: 75	100	1870: 50	100	Sept. 4: 35	35
July 11: 80	100	Jan. 1: 50	100	Oct. 17: 40	40
July 19: 85	100	Jan. 25: 55	100	1871: 30	30
July 26: 80	100	Mar. 4: 50	100	1878: 40	40
Sept. 7: 60	100	Mar. 25: 45	100	1872: 40	40
Sept. 10: 65	100	May 9: 40	100	1873: 38	38
Nov. 12: 100	100	Aug. 25: 45	100	1874: 36	36
Nov. 14: 115	100	Aug. 31: 50	100	1875: 37	37
Nov. 16: 135	100	Sept. 21: 55	100	1876: 39	39
Dec. 13: 138	100	Nov. 22: 60	100	1877: 39	39
Dec. 24: 100	100	1871: 30	100	1878: 39	39
1865: Jan. 1	100	1879: 35	100	1879: 35	100
Jan. 1: 100	100	Mar. 4: 50	100	1880: 35	100
April 9: 100	100	April 7: 45	100	1881: 15	100
May 15: 70	100	June 26: 40	100	1882: 10	100
Sept. 6: 67.5	100	July 10: 45	100	1883: 30	100
Sept. 11: 70	100	Aug. 11: 50	100	1884: 30	100
Sept. 17: 77.5	100	Sept. 21: 55	100	1885: 15	100
Oct. 10: 85	100	Oct. 3: 50	100	1886: 25	100
Oct. 17: 95	100	Oct. 25: 65	100	1887: 35	100
Oct. 27: 105	100	1872: 35	100	1888: 35	100
Nov. 2: 115	100	Jan. 1: 65	100	1889: 40	100
Nov. 7: 120	100	Mar. 25: 60	100	1890: 40	100
Nov. 9: 130	100	May 1: 50	100	1891: 35	100
1866: Jan. 1: 130	100	Aug. 25: 45	100	1892: 35	100
Jan. 9: 80	100	Sept. 2: 50	100	1893: 35	100
Feb. 23: 70	100	Sept. 9: 55	100	1894: 35	100
May 11: 55	100	Sept. 16: 60	100	1895: 35	100
June 7: 60	100	Oct. 14: 65	100	1896: 35	100
July 5: 65	100	1873: 40	100	1897: 35	100
Sept. 18: 75	100	Jan. 1: 65	100	1898: 35	100
Sept. 27: 85	100	April 15: 60	100	1899: 35	100
Oct. 10: 90	100	May 20: 45	100	1900: 35	100
Oct. 15: 100	100	Sept. 5: 50	100	1901: 35	100
Nov. 5: 105	100	Nov. 20: 55	100	1902: 35	100
Dec. 8: 90	100	Dec. 8: 60	100	1903: 35	100
1867: Jan. 1	100	1874: 35	100	1904: 35	100
Jan. 1: 90	100	Feb. 3: 55	100	1905: 35	100
Feb. 7: 80	100	April 15: 40	100	1906: 35	100
Mar. 4: 70	100	May 6: 45	100	1907: 35	100
Mar. 23: 60	100	Dec. 11: 40	100	1908: 35	100
April 15: 50	100	1875: 20	100	1909: 35	100
June 8: 75	100	Jan. 1: 40	100	1910: 35	100
June 21: 70	100	Oct. 1: 30	100	1911: 35	100
Sept. 2: 75	100	Oct. 12: 40	100	1912: 35	100
Sept. 23: 85	100	Dec. 1: 45	100	1913: 35	100
1868: Jan. 1: 85	100	1876: 25	100	1914: 35	100
Sept. 1: 60	100	Jan. 1: 45	100	1915: 35	100
Sept. 7: 65	100	Mar. 7: 40	100	1916: 35	100
Sept. 14: 70	100	April 13: 35	100	1917: 35	100
Dec. 6: 75	100	April 26: 22.5	100	1918: 35	100
Dec. 18: 30	100	May 5: 20	100	1919: 35	100
July 21: 25	100	Dec. 18: 30	100	1920: 35	100

Before considering the history of the rates as shown by this table, we should consider its limitations. In the first place it gives only regular schedule rates, such as were printed in the company's circulars to shippers. Now, it perhaps was always intended that these printed rates should be the basis of the rates actually charged, but in the earlier years much more than now great freedom was exercised in negotiating with shippers in making concessions from regular rates, paying rebates, etc. Thus the regular rate doubtless did not so nearly represent the actual rate in those days as it does now when there is no great disturbance. Irregularities which were common and expected then would not be thought permissible now; and we know that there are now considerable deviations from regular rates that do not result in an open rupture, and of which there is no trace in a file of published rates—as, for instance, since last July.

But aside from these deviations from the regular rates which may be called usual and customary, always existing to some extent, but to a greater extent previous to 1879 than since, we have to count with periods of great irregularity and open railroad war when there are no schedule rates—when the last schedule issued does not in any degree represent what the rates are, and no new one is issued because fluctuations are so great. When for a long time no change is shown in the schedule rate, it is possible that there was a period of railroad war or something like it, and if it was long ago, it may now be impossible to discover whether this was so or not.

We should say that for 1879 and 1881 we have given in the record figures representing approximately the actual rates charged, instead of schedule rates which are known not to have been observed.

Down to 1879 the rates were quoted in a depreciated and fluctuating currency, which at times made them very much greater than if they had been in the present standard gold currency. The rates are truly very much less now than they used to be; but the decline since 1865 has been not nearly so great as the figures make it appear. For instance, when the \$1.60 rate was made, Dec. 24, 1864, gold was at a premium of about 122 per cent., and the \$1.60 in currency would bring but 72½ cents in gold. The decline from 72½ cents then to 25 cents now is truly a great one, but it is not properly 84 per cent., as would appear from the currency figures, but less than 66 per cent. The lowest rate of 1864, 75 cents, was made when gold was 175, and amounted to but 48 cents in gold—large in proportion to the 15-cent rate at the same time last year, but not 187 per cent. greater, as appears from the schedule figures. To check the effect of the premium on gold, we give below the *gold value* of the highest and lowest rates

in each year at the time the rates were made down to the time of the disappearance of the premium on gold, in cents:

Year.	Highest.	Lowest.	Year.	Highest.	Lowest.
1864	60	43	1872	60	40
1865	83	43	1873	58	38
1866	89	49	1874	54	36
1867	68	37	1875	72	37
1868	64	41	1876	40	18
1869	55.5	28	1877	32	27
1870	53	35	1878	30	29
1871	58	30			

Thus, from the end of the war to the close of 1878 both highest and lowest rates had been reduced something more than one-half.

Since 1878, during a period when there has been an organization of the railroad companies to prevent the irregular reduction of rates, the highest and lowest in each year have been:

Year.	Highest.	Lowest.	Year.	Highest.	Lowest.
1878	40	18	1879	40	18
1880	40	10	1881	30	15
1882	40	30	1883	30	15
1884	40	18	1885	30	15
1886	40	25	1887	30	15
1888	40	25	1889	30	15
1890	40	25	1891	30	15
1892	40	25	1893	30	15
1894	40	25	1895	30	15
1896	40	25	1897	30	15
1898	40	25	1899	30	15
1900	40	25	1901	30	15
1902	40	25	1903	30	15
1904	40	25	1905	30	15
1906	40	25	1907	30	15
1908	40	25	1909	30	15
1910	40	25	1911	30	15
1912	40	25	1913	30	15
1914	40	25	1915	30	15
1916	40	25	1917	30	15
1918	40	25	1919	30	15
1920	40	25	1921	30	15

Thus in the last three years the highest winter rate has been one-fourth less than in the three years previous, and now, in 1885, we have a winter rate of 25 cents, still lower than any heretofore established for the winter. The co-operation of the railroads, it appears, even when most successful, has done nothing toward restoring the rates such as prevailed before 1876, and has not prevented a further decline in the regular schedule rates, such as the railroads have desired to maintain, much of the time without succeeding.

The object of their ambition this winter has been to maintain a 25-cent rate, which until 1883 had always been held as too low for a summer rate. The danger to the public that has been apprehended from the co-operation of the railroads, that it would enable them to collect exorbitantly high rates, has therefore not been realized. When co-operating most faithfully the rates established have been low and have been made lower from time to time. Aside from the exceptionally low rates made during railroad wars, or in consequence of less serious irregularities, which should be thrown out altogether as not reflecting the purposes of the co-operating companies, nor what they would be able to accomplish if they had had a closer organization, we find that with navigation closed they made a rate of 40 cents in the fall of 1879, 35 in 1880, 30 in 1882 and 1883, and 25 in 1884, and meanwhile the summer rate which they have desired to make has fallen from 30 to 25 cents—certainly as great a cheapening of one of the greatest elements in the cost of production as the most sanguine could have hoped for.

But it is evident that there can be no such reduction of rates hereafter. The charge having fallen from 83 to 25 cents, there is little room left for it to fall. Nowhere else on earth are rates so low; and whatever reduction in working expenses may be made hereafter, it cannot make it possible to reduce a charge of 25 cents by 58, 40, or even 25 cents.

It is probable, indeed, that it will be long before there is any reduction. A 25-cent rate leaves so small a margin over the cost of transportation that there will be little interest in securing traffic if there is a further reduction.

November Earnings.

Our table this week has reports of the November earnings of 79 railroads whose aggregate mileage and earnings and average earnings per mile were:

1884.	1883.	Inc. or Dec.	P. c.
Miles.....	62,428	59,984 +	2,444 4.1
Earnings.....	\$32,710,000	\$35,913,120 -	\$3,203,120 8.9
Earn. per mile.....	524	599 -	75 12.5

This is a more unfavorable showing than in any previous year, the percentage of decrease in earnings per mile in successive months having been:

P. c.	P. c.	P. c.
Jan. 9.1	May.... 2.8	Sept.... 10.2
Feb. 6.8	June.... 10.9	Oct.... 10.8
March.... 10.8	July.... 7.5	Nov.... 12.5
April (Inc.)... 1.5	Aug.... 12.1	

It can hardly be said of any of these months that they were good months, but some were worse than others, and the last four were very bad, with November the worst of all.

The number of roads in the Far West that have reported early enough for our tables is unusually large, and represents the condition of traffic west of the Missouri and Texas better than it is shown in any other part of the country, almost every important road being given, except the Oregon Railway and Navigation Company and the Atlantic & Pacific. The Atchison, Topeka & Santa Fe, the Central Pacific, the Denver & Rio Grande and its Utah extensions, the Oregon & California, the Union Pacific and the Utah Central make up the total of what we have called the "Far Western" group, classing the Northern Pacific and other lines northwest of St. Paul by

* Irregular reductions of as much as 5 cents were common in the last half of the year.

themselves, and the Chicago, Burlington & Quincy, which has a very important system west of the Missouri, with the Chicago roads.</p

make a better showing than any other group. Indeed half of them had an increase in total earnings and eight an increase in earnings per mile. Some of these gains were large, as 17.7 per cent. by the Elizabethtown & Big Sandy, and 27.7 by the Columbia & Greenville, not to speak of 29.8 by the new Georgia Pacific and 82.4 by the New Orleans & Northeastern. The latter had nearly as large earnings per mile as the old Mobile & Ohio. The large decreases are by the Shenandoah Valley, the Virginia Midland and the Chesapeake & Ohio.

The 21 of these roads that have reported heretofore had the following aggregate decreases in successive months :

July.	Aug.	Sept.	Oct.	Nov.
\$129,863	\$337,092	\$406,927	\$456,348	\$219,574

Thus the decrease in November is less than in any month except July.

Eight Eastern roads report:

1884.	1883.	Inc. or Dec.	P.c.
Miles	6,672	6,468	+ 204 3.1
Earnings.....	\$6,432,157	\$7,340,131	-\$908,064 12.4
Earn. per mile..	964	1,135	171 15.1

The Reading is missing from this table, and likewise the Eastern and the West Jersey. The remainder show a larger decrease than the average of the country. The Pennsylvania has about 30 per cent. of the mileage reported in this group of roads, and more than 60 per cent. of the earnings. The Grand Trunk has 44 per cent. of the mileage and 20 $\frac{1}{2}$ per cent.

We have thus passed in review all the different groups of states. The decrease has been greatest on the Eastern and the Northwestern railroads, and least in the Southern and Southwestern states.

Nut-Locks in Use.

The statistics presented in another column of existing practice as to nut-locks indicate that, to a somewhat surprising extent, in the race for favor between them, it is at present the Verona (steel ring) against the field, with the "odds" decidedly in favor of the Verona, so far as present practice and preference can fairly indicate them, there being now in the United States 60 officers of maintenance of way who favor the Verona to 40 who favor any one among all of the other devices, with, say, 20 more who are non-committal or in doubt, and therefore have not been counted at all.

We have endeavored in presenting these statistics of the existing status, however, to call special attention to the fact that no comparison of this kind can be a fair one as respects *merit*, since the various nut-locks have not had an equal chance. Some of those in the list, like the Iron City, Van Kuran, Van Dusen, Howe, etc., are of very recent introduction. Others, like the vulcanized fibre, though old in some form, are quite new in their present form, having had recent improvements made in them which may well alter their entire character and overcome all previous defects. The nut-lock question is, from its nature, not one which can fairly be considered at any time—certainly not at the present time—as absolutely settled, since a new device more meritorious than any other is always a possibility. It may well be that it is a greater indication of merit for a new nut-lock to have secured the approval of one or two lines than for an old one to have secured the approval of many. Nevertheless, when not abused by drawing unfounded deductions from them, statistics of present practice have their usefulness, even in an ever open question like that of nut-locks, and it is clear that the Verona must have had merit to enable it to get and keep its present predominant position, which seems to be confined to no section or class of lines. This is evident from the following figures giving the percentage of the total positive vote (omitting non-committal responses) which was in favor of the Verona :

	Companies.	Miles.
North and East	60.7 p. c.	75.8 p. c.
South	68.6 p. c.	56.0 p. c.
Northwest and Pacific	58.8 p. c.	65.5 p. c.
Total United States	62.4 p. c.	59.8 p. c.

The uniformity in these percentages is surprising. That the Verona, however, is not an ideally perfect nut-lock is evident from the fact that it throws an oblique strain upon the bolt, an evil due to the sharp bend about $\frac{1}{2}$ in. back from the ends which most of the nut-locks have as now manufactured, probably to give a better cutting edge and greater elastic resistance, and which it would seem impossible to flatten out fully in average practice so that considerable spring of the bolt would not be necessary to give the nut an even bearing. A number made this objection to the nut-lock, and it is one from which many of the others, whatever their other demerits, are free.

Electric Propulsion for the New York Elevated Railroads.

We publish on another page a report in which the writer estimates that an important saving in fuel can be effected by superseding locomotives by electric motors driven by electricity derived from dynamos at central station. The proposal is not altogether new, having been urged some time ago by Mr. Whiteside Rae and others. We took occasion to point out in these columns* that the estimates as to economy were based on very erroneous ideas as to the power necessary, the consumption of fuel on locomotives per unit of power developed, and the cost of the large stationary plant requisite for generating the electricity. Our defence of the locomotive has apparently convinced electricians that it is not quite so extravagant an engine as they supposed. Mr. Rae estimated that each locomotive on the elevated railroads indicated on an average 18 horse-power on a consumption of 28 lbs. of coal per indicated horse-power per hour. Professor Farmer, ten months later, estimates that on the Second avenue line (where the trains are lighter than the average of the elevated road), the consumption of fuel is only 5 lbs. per indicated horse-power, and the average power 110 horses. The difference is significant, and the conviction that one, at least, of these reports is wide of the mark is strengthened by the fact that one estimates the coal used by the locomotives costs \$8 per ton and the other \$4 per ton.

We would respectfully suggest that before attempting to supersede the locomotive, it would be just as well to ascertain what work the locomotive actually performs and what it actually costs to run it. These are facts which can be ascertained, and if the reports differ so enormously as to what is going on before our eyes, what value can they possibly have when they enter into the dim region of prophecy and give estimates of the saving to be effected by methods of propulsion that have as yet given, as we shall show, very poor results as regards economy of power?

Professor Farmer assumes that the dynamos and electric motors will deliver as useful work in propelling the train, 81 per cent. of the power put into the dynamos by the stationary engine. This differs enormously from the results attained in actual practice. A railroad worked by electric motors has been in use for over two years at the Zankerode colliery in Prussia, the line, electric motors, etc., being made by the well-known firm of electricians, Messrs. Siemens & Halske, of Berlin. The result, however, is that the electric motor develops 30 per cent. of the power indicated by the stationary engine that works the dynamo. Further improvements in dynamos and electric motors may reduce the gap between the estimated 81 per cent. and the actual 30 per cent., but until that is done, electric propulsion cannot claim a saving of fuel as one of its advantages

Judge Cooley's award of percentages of the Chicago freight and live stock shipments makes but small changes from the award of the first arbitration and is made to date Oct. 2, when it was agreed that the question should be reopened. It was then left for him to decide whether any changes which he should order should date back to cover any of the shipments under the first award—that is, any made after Jan. 8. Under the first award, which was not made until July, though it covered the business from Jan. 8, the Chicago & Grand Trunk was largely "over," and it objected to paying over the balances due the other roads on account of its excess, declaring that the arbitrators had neglected to consider important elements in the case. The other roads insisted that the whole existence of their combination depended upon the acceptance of arbitrations when once made, and they refused to take any new steps whatever in the matter until the Grand Trunk should pay the balances which had been declared due from it. This it finally agreed to, the other roads having consented that the question should be admitted to a new arbitration.

The chief change made by Judge Cooley in this new arbitration from the first award is said to be an addition of $\frac{1}{2}$ per cent. to the Chicago & Grand Trunk's share of the live stock and dressed beef, which is taken chiefly from the Lake Shore and the Baltimore & Ohio. By the first award the Chicago & Grand Trunk's share was 19 per cent. The revenue from this business at full rates is something less than \$3,000,000 a year, and therefore the additional $\frac{1}{2}$ per cent. should yield something less than \$45,000 a year, gross. Judge Cooley makes no change in this road's share of the other freight (12 per cent.), but he somewhat reduces the share of the Chicago & Atlantic, and increases that of the Nickel Plate. the

last of which had 7 per cent. and the first 10 per cent. by the first award. The Nickel Plate for some time has been carrying much more than the share allotted it.

The present irregularities in east-bound rates are charged to two principal causes: shipments, chiefly from St. Louis, by way of the Chesapeake & Ohio to Newport News for export, and shipments below tariff rates which reach New York or Boston by the West Shore and the Lackawanna roads, but which are brought to them at Buffalo by the Grand Trunk. It was resolved at the last meeting of the Joint Executive Committee that no road in the pool would carry for roads in or out of the pool (meaning the West Shore and the Lackawanna) freight on which less than the regular rate is charged. If this resolution were carried out, at this season of the year the West Shore and the Lackawanna would be forced to maintain rates, except on what grain they could get from the Buffalo elevators. But it is claimed that they do not maintain rates, and that the Grand Trunk continues to bring them large quantities of freight, especially from Milwaukee.

The competition of the Chesapeake & Ohio is something that was naturally to be expected whenever there should be a large crop in the southern part of the grain district and an export demand. The Chesapeake & Ohio has been completed to the mouth of Chesapeake Bay, whence there have long been considerable exports of cotton, and which is nearer than Baltimore to Liverpool by the whole length of Chesapeake Bay. From St. Louis and Ohio River towns the distance to Newport News is not much more than to Baltimore, and the agreement is that the rate shall be the same to both. If vessels were as sure of cargoes, they would ask no more to carry from Newport News than from Baltimore. But our export business usually has to be nursed in its infancy, and the Chesapeake & Ohio is said to be nursing this infant business at the capes of the Chesapeake, chartering vessels and giving export rates such as will secure cargoes for them by the time they sail. The circumstances most favorable for the development of this business would be a large crop directly in the Ohio Valley—in Southern Ohio, Indiana and Illinois, and in Kentucky—and a very heavy export movement. This would keep all the older roads busy at good rates, and enable the Chesapeake & Ohio to get a large business and establish an export trade by a cut, which would still leave it a tolerable profit. As it is, most of the grain it gets must come from Missouri and Kansas, from which the Chesapeake & Ohio is a pretty direct outlet, and the traffic is so thin that it cannot be diverted to a new route without being felt. More has gone from St. Louis by this route recently, it is said, than by any other road; but the St. Louis shipments are not usually very large, and the amount cannot be very great, our total exports being small now. We do not hear that shipments are made to New York by this route, and they cannot be made economically.

There are again irregularities in the rates on east-bound freight, which are especially to be deplored at this season, as they may destroy the profit of the winter's business, which ought to be large, while after navigation opens large profits from the through business are usually impossible, because if the rates are remunerative the grain goes by lake. Moreover, it has usually been impossible to restore rates when there has been much cutting early in the winter. In several years, irregularities which were not thought very important in December have resulted in serious reductions in rates about the first of January, after which rates declined, so that by February or March they left no profit, and the winter's business became almost valueless. This was the case in the winter of 1878-79, when rates in February at times were among the lowest ever made, and the demoralization continued until August. In the winter of 1879-80 rates were well maintained, and also in 1880-81, except that about February or March reductions were made on large shipments by one company. The winter of 1881-82 began with the railroad war of 1881 at its hottest. Peace was made and some advance in rates ordered Jan. 28, but by that time most of the traffic had been carried at absurdly low rates, and a great part of what was left behind was contracted for at similar rates, while not even a formal advance to 25 cents per 100 lbs. was made until near the end of March. In 1882-83 rates were pretty well maintained through the winter. In 1883-84 there was more or less secret cutting of rates through December, and open reduction to 20 cents (from 30) for ten days in January, a restoration that was not well observed, through January and February, then a reduction to 20 and finally

* See Railroad Gazette, page 222, March 21, 1884.

to 15 cents some six weeks before navigation opened. All the efforts to prevent the utter destruction of the profits of the traffic seem to have had little effect, except perhaps last year, when, though rates were irregular all winter, they did not become wholly profitless until about the middle of March, and probably in 1879 also the rapidity of the decline was checked by the efforts made to prevent it. But for the part played by Mr. Fink's organization, the rate may have gone to 15 cents before the end of January, and remained there both in 1879 and 1884. The trouble this year seems to have been exceptionally obstinate, though it has never resulted in open war, rates going down for a week or two or three weeks, then being generally restored, and so fluctuating up and down at frequent intervals. Such a state of things is well calculated to check shipments when the rates are maintained, as experience indicates that the shipper will only have to wait a little to get a material reduction. It also works great injustice to all but steady and regular shippers, who make up for the losses of one week by the gains of another, because the man who has paid 25 cents per 100 lbs. for the carriage of his goods from Chicago to New York has to compete in selling them with the man who a little before or after got his carried for 15 cents.

The most notable feature in the grain receipts at New York during the month of November is the very large amount brought by the West Shore road. The total rail receipts were 21½ per cent. larger than in the previous month, but the receipts of the West Shore were 59 per cent. greater. They were 13½ per cent. of the total rail receipts, while the Lackawanna's were but 7½ and the Pennsylvania's but 11½ per cent. Considering the limited rail connections that the West Shore has west of Buffalo, this is a very large business. It did not have to depend upon the railroads for it, however, as the lake vessels afford grain to any carrier who will bid low enough for it in competition with the canal.

New York rail receipts (grain and flour) in November and for the 10 months previous were:

By rail:	November.		10 mos. to Oct. 31.	
	Bushels.	P.C.	Bushels.	P.C.
N. Y. Central...	3,215,315	40.5	24,361,693	41.1
Erie.....	1,963,862	25.0	16,434,149	27.7
Penna.....	915,939	11.5	9,280,446	15.6
Lackawanna....	596,512	7.5	4,270,777	7.2
Other roads....	1,228,254	15.5	4,975,421	3.4
Total by rail...	7,939,882	100.0	59,330,886	100.0

The "other roads" in 1883 carried less than 150,000 in November, which was more than in any earlier month, and it is safe to say that as much as 1,075,000 bushels of what was received by them in 1884 came by the West Shore, and that it then carried 13½ per cent. of the New York receipts, against 2½ per cent. in the ten months previous. Its ability to carry a large share of the grain is thus proved, and it is probable that it will hereafter remain a formidable competitor for the business. Probably it carried at less than the regular rates to secure so much business, and it cannot do this, now that navigation is closed, without the co-operation of some railroad west of Buffalo.

The large traffic is likely also to have some effect on the "staying power" of the West Shore in its contest with the New York Central. Traffic of this kind it ought to be able to carry at a very low cost, and if the regular rates had been maintained there must have been a considerable profit on its November grain traffic. Rates were not maintained all the time by anybody, but it may very easily be that there was some profit on all this business, which is an important matter when the whole passenger traffic is carried at a loss.

Efforts have been made at Chicago to restore and maintain east-bound through passenger rates, which have not yet succeeded, but are not yet abandoned. There has been at no time so great reductions in these rates as in the rates from New York, and until recently we believe there was no open reduction, though the full price was obtained for but few tickets, a cut of \$4 being general, to \$16. The disagreement of the Chicago railroads is as to the payment of commissions to outside agents. The Chicago & Grand Trunk insists that this is necessary for it, and the other roads declare that commissions so paid always result in a cut to the passenger, and that they must and will meet any such cuts. On the failure of a meeting last week to agree on this point, an open reduction of rates to \$14 was made, New York newspapers have commented on the fact that the Pennsylvania sold tickets at reduced rates as well as the other roads, as if it indicated a change in its policy at New York, where it has refused to sell tickets to Chicago at less than \$20, while the highest open rate by any competitor was not more than \$12, and many tickets were sold at less than \$10. But the circumstances are different at the

two ends of the Pennsylvania's line. At the New York end a \$12 through rate would demoralize the rates on the enormous local traffic of the eastern half of the line; at the Chicago end the local traffic that can be demoralized is comparatively insignificant. It is to preserve the profits on its local business, and not contempt for the through traffic or indifference to a diversion of it, that has led the Pennsylvania to maintain its rates from New York to Chicago. It had more to lose than to gain by meeting the low rates of its competitors. Quite probably it has more to gain than to lose by meeting them at Chicago.

Mr. Pieron, Vice-Chairman of the Joint Executive Committee, has proposed to the Chicago roads to pool the travel eastward and permit the payment of commissions by the method recently suggested, through the railroad companies' agents and under the direction of the pool authorities, just so great and so long as should be found necessary to cause the traffic to be distributed in the proportions agreed upon. It is difficult to see how anything can be accomplished unless there is some understanding, tacit or open, as to the proportion of business the road should get which has to offer special inducements to secure passengers. If it does not interfere much with the business of other roads, they are not likely to find fault, however great the commission and to whomsoever paid. The question with them is, how much of the business is it getting; this they will not know exactly unless there is some agreement, and their ideas of what is the Grand Trunk's "fair share" are likely to differ from the Grand Trunk's ideas, so that they are almost sure to make reprisals when the Grand Trunk thinks it is only beginning to get its share.

We had not heard of Chicago as a sheep-growing town, and in fact should hardly have dared to suggest that any herbivorous animal could find pasture there. But the Chicago Board of Trade figures, which of course can never lie, indicate that Chicago produces more wool than any ranch of equal extent in New Mexico or Australia. Its reports show that for the last four years the aggregate receipts of wool at Chicago have been 164,306,089 lbs. and the shipments 189,861,148 lbs., showing the Chicago production for the four years to have been 25,555,057, or about 8,400,000 lbs. a year. More than a million of very superior sheep must find pasture in the Chicago streets to produce all this wool, and sheep shearing must be an important industry there. From sundry reports from time to time the impression has prevailed that only lambs were shorn there. If so, there must be more even than a million of them, or the fleeces which they lose there are extraordinarily large.

The managers of a joint-stock company in France were recently prosecuted criminally, charged with declaring a fictitious dividend. A law of France passed in 1867, as also a law of Belgium, passed in 1873, provides punishment for paying dividends made without taking an inventory, or based on a fraudulent inventory. In the case in question a company was formed with a capital of 500,000 francs, authorized to increase this capital to 10,000,000 francs. By successive issues the capital was actually raised to 5,000,000 within five months, but between the two issues dividends were declared. Complaint was made that the dividends were fictitious. The court soon decided that there were no profits that could be divided legitimately, and then it took up the question of the "good faith" of the directors, whether they were not themselves misinformed or mistaken as to the position of the company. The court found that the accounts accessible to the directors were sufficient to make them understand the true condition of the company, and that it was not reasonable to suppose that they did not understand it. The court thereupon found the directors guilty and sentenced them to imprisonment.

French law and justice of this kind would have saved certain railroad investors many millions of dollars in this country within the last ten years, and checked the activity of some of our great financiers.

Surprise is expressed that there have been so few applications from this country for space at the International Exhibition of Inventions to be opened in London next May. The President recommended to Congress to provide for a government commission to take charge of the American exhibits, but it has not done so, and as applications for space will not be received after this month, no government action now is likely to have any effect in increasing our representation at the exhibition. But our inventors ought not to need that aid. They usually are able to take pretty good care of their own interests, and a great many of them, it would seem, can expect decided benefit from such an opportunity to show their devices. The time for

application was to close Dec. 31, but at the instance of Mr. Pierpont Edwards, British Consul at New York, the time has been extended for a month. Further to assist intending exhibitors, Mr. Edwards is prepared to give intending exhibitors all the preliminary information required, directions for making application for space, and official application blanks.

The Cost of Rear Collisions.

Mr. Archimedes Stephenson Watt protests, in the *Railroad Gazette* of Jan. 2, against our estimates of the cost of these disasters in the month of October; and we suspect with an obscured satire, suggests that we procure accurate statistics from those who are suffering from them, or that we shall station reporters to give us estimates approaching accuracy.

We believe it might prove a valuable service to the railroads if they were to furnish accurate accounts of the cost of these occurrences, not necessarily for detailed publication; until such authoritative statements are obtainable, we shall maintain that our rude estimates are not far from a just average, although rather under than above it. Besides, it really does not matter much in the argument, whether the cost of equipping all the roads with starting signals, or semaphores, would be recovered in 20 months, as we have estimated, or in a longer period; the advantages to be derived from putting an end to these constantly recurring rear collisions would be considerable enough, even though our estimate prove too high. We are confident, however, that this is, on the contrary, too low, taking the year through, or one year with another.

For instance, our account of "Train Accidents in November" enumerates 15 tail-enders out of 30 rear collisions, whereas we had 17 out of 29 in October; but there were 5 persons killed and 85 cars destroyed, against 4 persons killed and 82 cars destroyed in October; so that taking the figures used in our estimate for October, the average cost of each accident would be something over \$1,000, instead of \$3,530, as we had estimated for the first month.

There was a time when these occurrences were regarded somewhat as a matter of course by an indulgent public; perhaps sympathy with the flagman had a good deal to do with this feeling; it was felt that men when called upon to flag following trains must sometimes fail; and upon the supposition that there was no better mode of controlling the trains, the railroads escaped condemnation. Many a capable railroad manager could then testify that he knew of no better way; he had never known of any other having been tried. He would not now be in a similar state of knowledge if called into court; he would probably be compelled reluctantly to admit that only the unwillingness of his company to make the necessary expenditure had led him to do without signals so long.

It is certainly worthy of consideration by railroad companies whether they can with impunity continue to destroy property and, as we see monthly, human lives, in collisions which are clearly preventable by simple means, as has been abundantly shown by the experience of several of our best American railroads. There are instances of rear collisions upon roads which have signals in use, but they do not occur when the signals have been judiciously located, properly used and promptly obeyed; they only make it plain how much is effected by the use of signals in the immense multitude of instances when they are rightly used and heeded.

It does not require demonstration that if an interval of distance, say three or five miles long, is maintained between trains, they cannot possibly collide; and such an interval may be maintained in the most positive manner by the use of the telegraph and signals; and, as we have shown, for an insignificant addition to the expenses.

November Earnings of the Chicago, Burlington & Quincy Railroad.

The earnings of this road in November last show an exceptionally large decrease, not only from the corresponding week of 1883, but also from the previous month of 1884. There is always a decrease from October to November, but it has never been so large before. The amount by which the November receipts have been less than the October receipt has been in successive years:

1880.	1881.	1882.	1883.	1884.
\$96,838	\$214,868	\$80,023	\$179,706	\$449,700

The decrease was 17 per cent. this year, against less than 7 per cent. last year. The reasons for so great change, so far as known, are a through passenger rate of \$1 from Chicago to Missouri River points (against a regular rate of \$14.50), a lumber rate of 5 cents, against a regular rate of 15 to 18 cents, the lack of corn to carry, the old crops having been marketed and the new one not yet fit to ship, and, probably, the cessation of the heavy wheat shipments from Kansas, Nebraska and Iowa, the bulk of the crops having been marketed before November, or the shipments having been checked then by a fall in prices.

The gross and net earnings and working expenses of this road in November have been, for five years:

Year.	Miles.	Gross earnings.	Expenses.	Net earnings.
1880.....	2,712	\$1,837,860	\$858,206	\$979,654
1881.....	3,168	1,816,133	912,980	903,153
1882.....	2,229	2,100,421	830,559	1,230,862
1883.....	3,284	2,562,774	1,074,709	1,488,065
1884.....	3,400	2,233,801	1,088,845	1,145,046

Compared with 1883 the changes are:

Gross earn.	Expenses.	Net. earn.
Amount .. Dec. \$824,873	Inc. \$14,138	Dec. \$843,019
Per cent .. 12.8	1.4	23.0

The decrease is large in gross earnings and very large in net, there being no decrease in expenses.

Compared with 1882 there is a small increase in gross

earnings (2 per cent.), but the increase in expenses is so great that there is a decrease of \$185,816 (14 per cent.) in net earnings. The increase in mileage is moderate (7 per cent.) since 1881, but it is large (25 per cent.) since 1880.

For the 11 months ending with November, this company's earnings and expenses have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1880.....	\$18,902,475	\$8,681,493	\$10,220,983
1881.....	19,270,965	9,703,162	9,567,803
1882.....	19,514,744	9,892,698	9,622,046
1883.....	23,039,451	11,781,502	12,257,949
1884.....	23,423,313	12,056,228	11,367,085

Compared with 1883 the changes are:

Year.	Gross earn.	Expenses.	Net earn.
Amount.....	Dec. \$516,138	Inc. 274,726	Dec. 790,864
Per cent.....	9.2	2.3	6.5

The decrease in gross earnings is a small proportion of the whole, and would not be significant but that five-eighths of it occurred in the last month of the eleven. There was, in fact, an increase of \$73,683 in the first eight months of the year, while in the three fall months there was a decrease of \$589,821, or 7 per cent. A large part of the decrease in net earnings, however, occurred before August, there having been gains in August and September, and only a small loss in October.

There is good reason to suppose that November was an exceptionally unfavorable month, though December was not in all respects a good one. But there was less waste of money by railroad wars then. Under the circumstances we should naturally expect a great corn and hog movement over this, the greatest of the corn and hog roads, in January, but it does not seem to have begun yet. A favorable turn may be expected, however, in no very long time.

December Earnings.

The reports of earnings in December so far received are not all so discouraging as those for November, which is sometimes due to the earnings having been unusually small in December in 1883. This is the case with the Chicago & Northwestern, whose earnings in December have been:

1880.	1881.	1882.	1883.	1884.
\$1,472,902	\$1,855,476	\$1,826,929	\$1,700,576	\$1,922,700

Thus the increase over 1883 is \$162,124, but over 1882 it is only \$95,771, and over 1881 only \$67,224. The earnings are, however, larger than in any other December, and in every other month since April it has suffered a decrease, both from the earnings of 1883 and from those of 1882.

The Chicago, Milwaukee & St. Paul makes but a slight gain over 1883, but its earnings were not exceptionally small then. Ever since July this road has shown monthly earnings nearly the same as in 1883, the changes either way being small—a loss of \$25,000 in August, a gain of \$19,700 in September, a gain of \$8,000 in October, a loss of \$79,700 in November, and now a gain of \$70,000 in December.

The St. Paul & Omaha has the same December earnings in 1884 as in 1883, and more than in any previous year. It lost \$44,000 in November and \$48,000 in October, and for four months previous lost about \$43,000.

Farther northwest, the St. Paul & Manitoba shows a continuance of the gains which it has had since September, the gain in December over 1883 being 17 per cent. The Northern Pacific, on the other hand, has a decrease of \$116,805 (14 per cent.), against a loss of \$160,831 (13 per cent.) in November. December was the first month that the new route to Oregon, via the Union Pacific, was open, and this must have had some effect on Northern Pacific earnings. The Canadian Pacific has a large gain, but not nearly in proportion to mileage, and its earnings per mile were only about \$170—probably most of them on its Ontario lines.

Coming farther south we have an increase of more than 10 per cent. on the Burlington, Cedar Rapids & Northern, which had a decrease of 11 per cent. in November and one of 9 per cent. in October, and some decrease in every month but one since May. The Central Iowa had a small gain in December, a very large loss in November, and large gains in October and September.

The total of the Illinois Central's lines, extending from Sioux City and Chicago to New Orleans, increased 3½ per cent., after a decrease, and often large decrease, in every other month since May. The Chicago & Alton shows a larger decrease than in any previous month of the year, but it is small in comparison with what many roads are suffering, amounting to but \$57,302 (7½ per cent.). The St. Louis & San Francisco, which had made very large gains previous to November, and gained slightly in that month, shows a decrease of 7 per cent. in December.

On the whole, the earnings, so far as reported, are less unfavorable than in the earlier months.

Some idea may be had of the losses to the country by the light corn crops of late years, by the great decrease in our exports of hog products. For the 11 months ending with November these have been for eight years, in millions of pounds:

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
639.1	1,006.1	1,063.5	1,178.6	926.0	569.9	681.3	535.2

Thus the exports in 1884 were even a sixth less than in 1877, and were 54½ per cent. less than in 1880, and 21½ per cent. less than in 1883.

For the last four years the value of these exports has been:

1881.	1882.	1883.	1884.
\$85,845,256	\$61,741,430	\$70,424,400	\$51,435,747
—decrease in 1884 of 27 per cent. since 1883 and of 40 per cent. since 1881.			

Nor has there been, as might have been supposed, an increase in the exports of beef and other cattle products. On the contrary, these have decreased, though not much compared with the hog product. For four years these cattle

products (including butter and cheese) have been for the eleven months:

	1881.	1882.	1883.	1884.
Pounds.....	345,648,970	224,253,961	322,237,537	308,618,579
Value.....	\$34,499,886	\$23,221,502	\$36,466,953	\$33,297,537

The decrease in quantity since 1881 is about 10 per cent., but in value only 3 per cent. The decrease in quantity from 1883 is chiefly salt beef.

The large crop of corn is going to enable us soon to supply more provisions for export than in any recent year, and may lay the foundation for another great growth of that business, though with the present condition of industry in Europe we must sell meat very cheap in order to have any great foreign consumption of it.

Chicago through rail shipments eastward for the week ending Jan. 2, and for each of the two weeks previous, have been, in tons:

	Dec. 20.	Dec. 27.	Jan. 3.
Flour.....	11,861	8,123	9,394
Grain.....	26,845	16,938	19,362
Provisions.....	14,326	9,324	10,648
Total.....	53,032	34,384	39,404

The holidays may have reduced shipments in the last two weeks, though the shipments of the last week of December and the first week of January have not infrequently been among the largest of the year. Last year, however, they were very small—smaller than this year.

The percentages carried by each road in each of the last six weeks are given below, the local as well as through freight included in the first three of these weeks.

	Nov.	Dec.	Dec.	Dec.	Dec.	Jan.
Chic. & Grand T.....	8.4	14.1	15.4	20.2	15.5	20.4
Michigan Central.....	27.3	24.8	24.0	24.3	22.5	20.0
Lake Shore.....	20.4	7.5	13.9	11.6	11.7	14.5
Nickel Plate.....	18.6	12.7	13.9	9.2	17.2	11.5
Ft. Wayne.....	9.7	18.6	12.0	14.4	13.4	15.0
C. St. L. & P.....	4.4	6.9	4.9	7.2	6.0	6.3
Baltimore & Ohio.....	2.2	6.4	5.6	7.4	9.2	7.2
Chicago & Atlantic.....	12.0	9.0	10.3	5.7	4.0	5.1
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

The Grand Trunk again takes an exceptionally large proportion, and the Michigan Central has a smaller one than heretofore, both tending to an adjustment. The Chicago & Atlantic, which is perhaps further behind in the pool than any other road, had not half its share and so increased its shortage.

The Chicago & Grand Trunk carried 31½ per cent. of the provisions and 23½ per cent. of the flour, but only 13½ per cent. of the grain. The two Pennsylvania roads together carried 29½ per cent. of the provisions, or less than the Chicago & Grand Trunk alone.

There has been a very great decrease in the wheat receipts of the Atlantic ports since lake and canal navigation closed, perhaps chiefly due to the closing of navigation, though there has been some decrease at other ports than New York. The average weekly receipts were 2,360,000 bushels in October, and 1,820,000 in November, being 1,744,000 in the last week of November. For the next four weeks they have been:

	Av. in Nov.	Dec. 6.	Dec. 13.	Dec. 20.	Dec. 27.
At New York.....	1,230,055	301,123	150,150	136,500	138,750
Elsewhere.....	590,000	673,043	412,593	480,584	378,691

For the last two weeks the New York receipts have been but one-ninth of the November average, while the decrease at the other Atlantic ports has been comparatively small. The flour receipts, however, have kept up very well, and by far the larger part of these were at New York and Boston since as well or before navigation closed.

Taking all grains together, New York had 60 per cent. or more of the total seaboard receipts in every fall month, and 64½ in November, but its proportion after the first week of December fell to about 35 per cent.

The Chicago Tribune estimates that the value of the produce received there, including little except products of the soil, and primary manufactures from them, like flour and provisions, has been as follows for eight years, in millions of dollars:

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
203	218	253	312	307	382	400	356

The value in 1884 was thus 11 per cent. less than in 1883, and less than in any other year since 1880, but 75 per cent. more than in 1877 and 40 per cent. more than in 1879. The weight of this produce, in tons, is given as follows:

1881.	1882.	1883.	1884.
6,200,000	5,400,000	6,935,000	6,800,000

There is no other place in the country, except New York, where there is anything like these receipts of farm produce.

The number of live cattle brought to New York city last year was less than in any other year since 1879, having been for eight years

Year.	Number.	Number.	
1877.....	507,832	1881.....	683,558
1878.....	543,587	1882.....	630,408
1879.....	575,150	1883.....	672,045
1880.....	679,987	1884.....	609,263

This decrease is doubtless due to the larger consumption of beef slaughtered in the West and brought to New York in refrigerator cars, which last year amounted to about 120,000 carcasses, and to a decrease in exports, which have been considerable in several years. For six years the exports have been:

1879.	1880.	1881.	1882.	1883.	1884.
33,295	85,406	38,923	18,939	67,964	50,105
Dressed.....	72,029	79,115	71,825	55,603	66,040

Total..... 103,324 184,521 110,748 74,542 164,004 153,594

The exports were about one-fourth of the arrivals last

year, a little less than a fourth in 1883, one-ninth in 1882, and 24 per cent. in 1880.

The price of rails in this country reached a lower point in 1884 than ever before. Quotations at Philadelphia were \$32.50 per ton at the beginning of the year, but the price fell very soon to \$30, and in August sales were made at \$2

This was not so important when the first freight lines were established as it has since become; but any other mode of using cars is now the occasion for an excessive movement of empty cars from place to place, in order to find appropriate loads.

When cars are in great demand upon a large system of roads, they can only be judiciously distributed by one person, who commands a complete view of the equipment available at all parts of the system, and the wants of all. Such a view may be had by properly arranged telegraphic reports from each station to its division headquarters, and from all the divisions in a condensed form, to the central office. By the use of blanks in which every kind of car in each line is designated by a different letter of the alphabet, the numbers of all kinds at each station, and the number required to be loaded at each, may be indicated by a few symbols; and the report may be ready at an early hour, to permit the distribution to be made, by orders from the central office to division headquarters, and from them to stations.

An examination of the reports of the great railways will show results something like this: number of tons moved per car in a year, from 500 to 600, or about $1\frac{1}{2}$ tons per day; or say 19 days for each car-load of 15 tons; yet, as the average car-load has probably not reached that weight on any road, the journeys are somewhat more frequent than this would indicate. The average movement per car per day is found to be, upon active roads, for the year about 36 miles, varying with the several classes of cars from 12 miles to 80; the most rapid movement taking place in stock cars; next in line cars, and after that in local cars, which do not leave the road. The delays to local cars, especially to those which handle coarse materials, as lime, coal and lumber, are notorious and shameful; they result in great loss of traffic to the roads, because the equipment is not generally sufficient for the demand, and in injury to shippers and consignees who are not, in consequence, promptly served; evidently the remedy is not in providing more cars, but in compelling them to be promptly loaded and unloaded. So far the supposed necessities of competition have prevented any general adoption of a charge for the delay of cars by failure of consignees to unload; or when such a charge has been adopted, it has not been enforced long enough to have any permanent effect; but it has been frequently proved that a moderate charge, say 50 cents a day for all delays over 24 hours, sufficed to insure quick unloading, when it has been strictly enforced; for business men are not indifferent to their interests, and will exert themselves to avoid any unnecessary tax. Experience has demonstrated, however, that as the freight departments of most railways are organized, as if for the sole purpose of obtaining traffic without regard to revenue, it will not be possible to collect this tax through the ordinary agencies. The superintendent's department will be the most likely to see it laid on without fear or favor, for it is that one which finds itself imposed upon by the delays of shippers and consignees. It ought not to need much argument to convince all departments, that it would be better to lose the traffic by which the cars are delayed, if thereby the cars can make more frequent trips with other traffic, which is awaiting means of transport.

The delay of cars when on foreign roads has been one of the sorest grievances of which the railways have had to complain to each other, for which no adequate remedy has been found. It has been ably treated of in papers by Mr. W. P. Shinn, before the American Society of Civil Engineers, and discussed by persons of experience; those who wish to study the subject in detail are referred to this discussion. Probably there is no better remedy, in the present condition of roads and of traffic, than would be afforded by the simple expedient of reporting the mileage and actual position of each car upon every road to its owners. This would often enable the owners to provide loads homeward, instead of having the car wait idly for a load to turn up, or for the convenience of the other roads to return it empty. Nothing seems more reasonable than that a road should demand such information as to the whereabouts of its cars; the experiment of making such reports has been tried and found to be easy, valuable, and not too costly.

Akin to the loss from delays of cars is that unknown but immense deficiency in revenue from not weighing the loads which they carry—a loss which is not felt, because it is not known until weighing is resorted to, but which may as reasonably be neglected in the transactions between a grocer and his customers as between a railway and its shippers. The cost of track-scales has often been pleaded in extenuation of a neglect to provide them; but where the traffic amounts to ten cars per day, experience shows that the gain to revenue may be reckoned upon to repay the cost of scales in a year. It is not necessary to have track-scales at all stations, because cars may be weighed at junctions and termini; it is insisted that the weight carried should always be accurately known and charged for. The only party who suffers by a car-load rate is the railway company.

There are few stations in the older parts of the country at which the business would not be increased by the erection of a good crane or derrick, for many shipments which are almost impossible, or are undertaken with great hesitation where there is none, would be rendered easy if such a convenience were at hand; the saving of delay in loading and unloading from its use would also be considerable; the neglect to provide cranes at the larger stations is not excusable from the fact that it has not become customary, for there are always masses of stone, iron and machinery awaiting shipment or unloading at such places, which cannot be handled economically without the aid of a hoisting machine. If thought best, no doubt a slight charge would be cheerfully

borne by patrons for the use of it, yet the benefits to be derived by the company from its employment would be a sufficient return upon its cost.

It is to be regretted that charges upon freights are not divided, so as to show how much is for transportation, how much for handling, and what part is for the use of the stations or terminals. It can scarcely be doubted that such a division would be of advantage to the railway company, for the justice of the aggregate of small charges would be more readily appreciated than is a gross sum per hundred, or even a rate per ton per mile. These last methods of calculating rates must be very deceptive even to experienced transportation men, because they must be applied for various distances, to different articles destined to points at which facilities and expenses vary widely. At any station, it is probable that the cost of handling one class of freight will be per ton five times as great as that of another class; and that there will be other classes of which the terminals cost will lie all the way between these extremes.

Although these differences are not shown in the tariffs nor explained to shippers, it is very important that they shall be accurately known to those who make the rates, and duly considered by them. Among the few terminal charges which are now collected as separate items, the most important are those for switching; that is, for placing cars to be loaded or unloaded on private sidings, or on the sidings of other lines; at great stations this is a source of large revenue, if properly attended to. It is often, in our railway practice, left to the option of the agent at the station whether to make the charge or not; and sometimes there is no check upon his collections, and he reports to the treasurer such a sum as he pleases on account of switching. Such methods need reformation.

On long roads, the frequent breaking up of trains at the division termini and reassorting of the cars is a source of great expense, to reduce which it is worth while to expend much labor and to endure some delay, especially to freights which are not of a perishable character. Each time that a car is shunted it runs some risk of injury, especially to its draught irons and brakes; perhaps one-third or one-quarter of the repairs of freight cars is due to damage in shunting. The mileage of switching engines is not known; it is usually estimated at six miles per hour, at which rate the aggregate is about half as much as the whole mileage of engines upon freight trains. The amount of violent exercise to which the cars are subject, in consequence of this, can only be realized by those who are familiar with the operations of a terminal yard upon a dark and stormy night. Of course, if this switching is avoided, not only the damage to cars is less, but the number of engines and of yardmen may be correspondingly reduced. A great deal may be done to lessen the breaking up of trains, by making up solid trains for through and division points at termini and important junctions, and by starting trains out with the cars in the order in which they are to be left, if any are to be dropped on the way. It will require systematic effort, patience and the co-operation of many persons to accomplish great results in this, but success in it will benefit the railway company correspondingly.

The cost of hauling a train through a division is made up of items which do not vary with the number of cars taken or the tons hauled, to an appreciable extent; only the quantity of fuel and of water consumed by the engine are affected enough, by any difference in the load, to make that difference perceptible. It is, therefore, a ready means of reducing the cost of transportation to increase the loads taken by the engines, if they can be increased, as on many roads they can. The number of cars may often be augmented upon the whole length of a division, except at some limiting grade, at which it will be advisable to station a helping engine, if the traffic is sufficient to justify it, which may be easily determined by a calculation; or a part of the train may be left upon a siding at the foot of the grade, to be returned for by the engine when the other part of the train has been taken to the summit. Such additions to the work done will be resisted by the employés concerned, and even by officers, because of the trouble involved; the employés frequently object because the number of trips required and therefore the number of men employed are thereby reduced; yet, as these objections are not well founded, they always yield to a persistent determination. Where the nature of the country and the volume of traffic will admit of it, the best mode of overcoming the limiting grade is by a reconstruction of the line, reducing the grade. This has been done very profitably upon many of the older railways.

When the movement of freight is obstructed upon a great road, in consequence of some great storm or disaster, the accumulation of cars, if the traffic is at its height, may become almost appalling to those who are charged with the duty of forwarding them to destination. The blockade is sometimes rendered much worse than it need be by injudicious efforts to "rush things."

The amount of traffic which can be passed through a division yard in a given time is often the limiting consideration; and, generally, such yards will admit of useful work by only a certain number of switching engines. It will therefore be impossible to take care of more than a determined number of trains at once; to allow more than that number to enter the yard would result in hindering the operations of the yard-men and cause delay instead of hastening the movement. The chief duty of a superintendent, then, will be to keep all trains under control, so as to prevent any blockade at any point. The zeal of yard-men and of train dispatchers at the termini is apt to be quite sufficient to hasten the departure of trains in as rapid succession as the power at command will admit of. When the trains have reached the next division yard, their responsibility for them is ended. There must be some one in control of the

whole movement, who will arrest it from either direction when it is too rapid. The worst blockades have resulted from overcrowding, in consequence of a want of coolness or of firmness on the part of the superintendent or manager, who will be beset at such times not only by the troubles incident to the movement of trains, but by the clamors of the shippers and consignees, aided probably by the officers and employés of other departments. If he loses his head, or yields a hair beyond his deliberate judgment, he may be lost; he must keep cool and trust to the successful unravelling of the snarl to be his vindication. The attempt to move too much traffic in a given time is likely to involve also destruction of engines and cars; the employés, being hurried and overworked, use less than common prudence, when the circumstances really demand more than usual caution to avoid collisions.

The small obstacles to the prompt movement of freight are too many to be recited, and they will differ upon every line and at every point upon it. They can only be discovered by the patient investigation of every complaint, and they can generally be removed when their cause is understood. Instead of regarding complaints as an annoyance, the judicious manager will look upon them as a help to improve his administration. He may be quite certain that they are not nearly so numerous as would be for his advantage—for there are only a few persons who are active-minded enough to write down their griefs; a very large majority only curse the road or its management for what they presume to be shameful indifference. It will be found that agents, who have been carefully instructed by circular, have not read the circular; that they lost their copy, or if they read it, they put a construction upon it which no other person, certainly not the author of it, could have entertained. Misunderstandings of this kind, wholly inconceivable until traced out, will account for a very large proportion of the miscarriages of freight. The "capacity of the human mind to resist information" is in nothing more thoroughly demonstrated than in this matter of forwarding freight.

CHARLES PAIN.

The Electric Cab Signal.

The Electric Cab Signal Company's method of signaling railroads and operating the gates of highway crossing is now in use on the Staten Island Railroad. The signals are given in a manner which widely differs from that used in any system now in general use. Instead of visible signals, placed near the track, the engineer is warned of danger by a whistle sounded in the cab. The advantage in a fog of an audible instead of a visible signal is obvious.

The means by which the signal is operated in the cab are simple. A dynamo on the engine generates a current which traverses a circuit formed in part by the rails. The current passes to the tender, thence to the tender wheels, through the rails to the engine wheels, and thence back to the point it started from on the engine. Any want of continuity in the rails between the engines necessarily breaks the circuit.

A signalman breaking the circuit, or an open switch automatically warns the engineer of danger by interrupting the rail circuit.

Highway crossing gates can also be lowered across the highway when a train approaches within a definite distance. The actual work necessary to raise the weight of the gate is performed by a treadle which is pressed down by the wheels of the engine. Any interruption to the circuit releases an armature in the cab, and allows a spring to move a cock admitting steam to a small whistle, which continues to sound until stopped by the engineer. The system is so arranged that a danger signal can be given by an ingenious mechanism more easily understood on inspection than described, the engine wheels simply placing a heavy weight in a position ready to lift the gate, but do not actually lift the gate. A catch holding the weight is released by electricity, and the movement of the weight lifts the gate when the tail of the train has passed. Thus the movements of the gate are regulated by electricity, while the work of overcoming the friction and weight of the gate is performed by the engine wheels acting on a treadle placed beside the rail.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Boston & Albany, annual meeting, at the Meionao in Boston, at 11 a. m., Feb. 11.

Buffalo, New York & Philadelphia, annual meeting, at the office in Philadelphia, Jan. 12, at noon.

Connecticut River, annual meeting, at the office in Springfield, Mass., Jan. 21, at noon.

Fitchburg, annual meeting, at the passenger station in Boston, at 11 a. m., on Jan. 27.

Lehigh Valley, annual meeting, at the office in Philadelphia, Jan. 20, at noon.

New York, New Haven & Hartford, annual meeting, at Loomis' Temple of Music in New Haven, Conn., at 11 a. m., on Jan. 14.

Philadelphia & Reading, annual meeting, at the office in Philadelphia, Jan. 12. The registry of stock closed Oct. 12.

Pittsburgh & Lake Erie, annual meeting, in Pittsburgh, Jan. 12, at noon.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atchison, Topeka & Santa Fe, 1 $\frac{1}{2}$ per cent., quarterly, payable Feb. 16 to stockholders of record on Jan. 10.

East Pennsylvania (leased to Philadelphia & Reading), 3 per cent., semi-annual, payable Jan. 20.
Long Island, 1 per cent., quarterly, payable Feb. 2. Transfer books close Jan. 15.

Little Schuylkill, 3½ per cent., semi-annual, payable Jan. 16.
Minshall & Schuylkill Haven, 3½ per cent., semi-annual, payable Jan. 15.

Railroad and Technical Conventions.
 Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Car Accountants' Association* will hold its annual convention at Minneapolis, Minn., beginning on Tuesday, June 23.

The *Master Car-Builders' Club* will hold regular meetings at its rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month. The next regular meeting will be on Thursday, Jan. 15.

The *New England Railroad Club* will hold regular meetings at its rooms in the Boston & Albany station in Boston, on the evening of the third Wednesday in each month. The next meeting will be held Wednesday, Jan. 21.

The *Western Railway Club* will hold regular meetings at its rooms, No. 103 Adams street, Chicago, on the third Wednesday in each month.

Trunk Line Presidents' Meeting.
 A meeting of the presidents of the Trunk Lines was held at the Commissioners' office in New York, Jan. 6, for the purpose of discussing the freight situation. It was stated that the west-bound rates were fairly maintained; but considerable cutting is reported on east-bound freight from Chicago and other points. The Baltimore & Ohio is accused of being the principal offender in this respect, but its representative denied the charge and claimed that it is maintaining rates better than some of the other lines. No action was taken at the meeting and an adjournment was made until Jan. 16.

ELECTIONS AND APPOINTMENTS.

Atlantic Coast Line.—Mr. J. R. Kenly has been appointed Superintendent of Transportation for all the roads included in this line—the Richmond & Petersburg, the Petersburg, the Wilmington & Weldon, the Wilmington, Columbia & Augusta and the Northeastern. His office will be in Richmond, Va. Mr. B. R. Dun is appointed Engineer of Roadway for all the lines, with office in Wilmington, N. C.

Mr. Kenly has been for some time Superintendent and Engineer of the Richmond & Petersburg road.

Atlantic & Pacific.—Mr. James Moylan, who was formerly connected with the New York, West Shore & Buffalo, has just been appointed Engineer in charge of maintenance of way. His jurisdiction will extend from Albuquerque, N. M., to Mojave, Cal. His office will probably be at Albuquerque.

Baltimore & Ohio.—This company announces the following appointments: J. T. Harahan to be General Superintendent of the Pittsburgh Division, with headquarters at Pittsburgh; David Lee to be Master of Road, Main Stem Division, vice S. R. Johnston, resigned; A. J. Cromwell to be Master of Machinery, Main Stem Division, to have charge of machine and car shops, except the shops at Mount Clare, which will be in charge of the Master Car Builder.

Brattleboro & Bennington.—At a meeting in Brattleboro, Vt., Jan. 6, the following directors were chosen: W. P. Jones, E. E. Putnam, Jacksonville, Vt.; O. R. Butterfield, J. H. Kidder, Wilmington, Vt.; Edward Crosby, J. J. Estey, G. W. Hooker, Brattleboro.

Boston & Lowell.—At the annual meeting in Boston, Jan. 7, the following directors were chosen: T. Jefferson Coolidge, Edwin Morey, Wm. A. Burke, Frederick E. Clarke, Thomas Talbot, Channing Clapp, Wm. Powell Mason. The only new director is Mr. Mason, who succeeds Josiah G. Abbott. The board elected Edwin Morey President, in place of Judge Abbott, and re-elected C. E. Cram Clerk; C. E. A. Bartlett, Treasurer.

Bridgton & Saco River.—Mr. Wm. F. Perry is President and Superintendent, with office at Bridgton, Maine.

Camden, Gloucester & Mt. Ephraim.—Mr. Frank S. Urie has been appointed Superintendent, Secretary and Treasurer, with office in Camden, N. J. He was recently on the Philadelphia & Atlantic City road.

Canada Southern Line.—Mr. E. C. Smith has been appointed agent for this line at Chicago, with office at No. 95 Clark street, in place of Mr. O. C. Foster, resigned. Mr. Thomas Conlon has been appointed acting Agent for the line at Toledo, O., in place of Mr. E. C. Smith transferred to Chicago.

Chicago & West Michigan.—The following circular from Vice-President and General Manager J. B. Mulliken, is dated Muskegon, Mich., Dec. 9:

"J. K. V. Agnew is appointed General Superintendent of this railway in place of Mr. A. M. Nichols, resigned, to take effect Jan. 1 proximo. Mr. Agnew will have entire charge of the Operating Department, and should be addressed on all matters pertaining thereto. Office at Grand Rapids, Mich. The position of Assistant General Superintendent is abolished."

Cincinnati, New Orleans & Texas Pacific.—General Manager John Scott has issued the following order: "On and after Jan. 1, 1885, the maintenance of the roadway and structure will be in charge of General Superintendent Carroll, with headquarters in Cincinnati. All orders concerning the subordinate offices and employees in those departments will be issued by Mr. Carroll or the division superintendent. Mr. Bouscaren, as Chief and Consulting Engineer, will on and from Jan. 1 have direct charge of the construction and reconstruction work, and will exercise a general supervision of the road bed, bridges and other structures on the road, to insure that the company's standards are maintained, and that all work is performed in accordance with the general plan adopted."

Cincinnati, Wheeling & New York.—Mr. E. C. Winstanley is now General Manager, with office at Cumberland, Ohio.

Cleveland & Pittsburgh.—At the annual meeting in Cleveland, O., Jan. 7, the following directors were elected: J. N. McCullough, Pittsburgh; George B. Roberts, William Bucknell, Philadelphia; Frederick Sturgis, S. J. Tilden, Charles Lanier, William C. Eggleston, New York; E. A. Ferguson, Cincinnati; J. V. Painter, E. R. Perkins, R. P. Ranney, Cleveland.

Delaware, Lackawanna & Western.—Mr. F. B. Griffith, General Foreman of motive power on the Buffalo Division of this road during the past 18 months, has been appointed Master Mechanic, with office at East Buffalo, N. Y. Mr. Griffith has been in the service of this company during the past 14 years, 12 years of which was on the Morris & Essex Division, where he held several important positions. He was formerly on the Hudson River road.

East Tennessee, Virginia & Georgia.—Major Henry Fink has been appointed Receiver by the United States Circuit Court. He is Vice-President and General Manager of the road.

Messrs. Isaac H. Bailey, Nelson Robinson and A. H. Stevens have been chosen directors in place of J. W. Bartow, Henry Fink and J. A. Robinson, resigned.

Hannibal & St. Joseph and Kansas City, St. Joseph & Council Bluffs.—Mr. W. J. Hilton has been appointed Assistant Treasurer, and Mr. C. M. Carter, Assistant Auditor, of these companies, with office at St. Joseph, Mo., to which place the offices of the Assistant Treasurer and Assistant Auditor of the H. & St. J. R. R. have been removed.

Indiana, Illinois & Iowa.—Mr. F. E. Drake having resigned the position of Auditor and Treasurer, Mr. H. P. Radley is appointed Auditor and Mr. Edwin Fletcher Treasurer of this company. Resignation and appointment took effect Jan. 1.

The offices of Train Master and Car Accountant are abolished. Mr. D. G. Henshaw is appointed Superintendent of Transportation of this company and will have charge of the train, station and car service departments.

Louisville, Evansville & St. Louis.—Mr. George F. Evans has been appointed Receiver of this road. He has been for some time past Assistant to the President.

Louisville and Nashville.—The following circular from the President's office is dated Louisville, Dec. 29: "The board of directors have adopted revised by-laws and organization for conducting the business of the company, to take effect Jan. 1, 1885. The following are the names of the officers of the company under such revised organization, viz.: Milton H. Smith, President, Louisville, Ky.; Eckstein Norton, Vice-President, New York; A. M. Quarrier, Second Vice-President, Louisville; Wm. W. Thompson, Acting Treasurer, Louisville; R. K. Warren, Secretary, Louisville; Russell Houston, Chief Attorney, Louisville; H. W. Bruce, Assistant Chief Attorney, Louisville; S. R. Knott, Assistant to President, Louisville; Alden W. Dunning, Assistant Treasurer and Assistant Secretary, New York; S. H. Edgar, Assistant Treasurer, Louisville; G. W. Proctor, Cashier, Louisville; Cushman Quarrier, Comptroller, Louisville; Reuben Wells, General Manager, Louisville; J. M. Culp, General Freight Agent, Louisville; C. P. Atmore, General Passenger Agent, Louisville; F. P. Huston, Purchasing Agent, Louisville.

Mr. G. F. Barnhart is appointed Superintendent of Transportation, his duties being defined as follows: "He shall have charge of the distribution of the car equipment. It shall be his duty to see that the cars are moved promptly, so that they may be made to perform the fullest service possible. He shall keep record of all the cars belonging to this company and a record of the movement of all cars on the company's lines, and an account of the amounts that may become due for the use of its cars on foreign roads, and of the amount due foreign roads for use of their cars on the roads of this company, and he shall make a monthly report of the same to the Comptroller, who will make a settlement of such accounts. He shall also have charge of the telegraphic service of the company, under such rules and regulations as may be adopted for his guidance, and perform such other duties as may be assigned him by the General Manager."

Maine Central.—Mr. H. H. Towle is appointed General Baggage Agent, with office in Portland, Me., in place of B. W. Angell, resigned.

Marquette, Houghton & Ontonagon.—Mr. W. A. Thompson, for some time past Master Mechanic, has been appointed Assistant Superintendent, with headquarters in Marquette, Mich. Mr. W. A. Maban, an old employee of the company, succeeds Mr. Thompson as Master Mechanic. Mr. Jos. Guy has resigned the position of Road-master, but his successor has not yet been named, and until one is appointed the duties of the position will be performed by Mr. Thompson.

Mobile & Ohio.—Mr. J. G. Motley is appointed General Superintendent and Acting Superintendent Southern Division. Mr. W. O. McMahon is appointed Master of Transportation.

Natchez, Red River & Texas.—At the annual meeting in Vidalia, La., recently, the following directors were chosen: Hiram R. Steele, R. F. Learned, Henry Frank, Isaac Lowenburg, George W. Debevoise, Louis Botts, Samuel Block. The board elected H. R. Steele President; R. F. Learned, Vice-President; Isaac Lowenburg, Secretary and Treasurer.

New Brunswick.—Mr. Alfred Seely is now General Passenger Agent, succeeding N. T. Greathead, resigned.

Pensacola & Atlantic.—The following circular from the President is dated Louisville, Ky., Dec. 29:

"The resignations of the following named officers have been accepted to take effect Dec. 31, 1884, viz.: W. D. Chipley, General Superintendent; F. B. Bonifay, Treasurer and Paymaster; R. M. Cary, Jr., Secretary and Auditor.

"The following organization will become effective Jan. 1, 1885: W. D. Chipley, Vice-President and Land-Commissioner, Pensacola, Fla.; R. K. Warren, Secretary, Louisville, Ky.; W. W. Thompson, Acting Treasurer, Louisville, Ky.; Cushman Quarrier, Comptroller, Louisville, Ky.; Reuben Wells, General Manager, Louisville, Ky.; R. Montfort, Resident Engineer, Louisville, Ky.; J. M. Culp, General Freight Agent, Louisville, Ky.; C. P. Atmore, General Passenger Agent, Louisville, Ky.; F. P. Browning, General Baggage Agent, Louisville, Ky.; Theodore Welch, General Freight Agent, Montgomery, Ala.; E. O. Saltmarsh, Superintendent, Pensacola, Fla.; F. C. Shepard, Division Freight and Passenger Agent, Pensacola, Fla."

Petersburg.—The officers of this road are now as follows: General Manager, H. Walters, Baltimore; General Superintendent, J. F. Divine, Wilmington, N. C.; Superintendent, R. M. Sully, Petersburg, Va.; Treasurer, M. W. Yarington, Richmond, Va.; Auditor, L. E. Clark, Richmond.

Richmond & Petersburg.—Mr. R. M. Sully is appointed Superintendent of this road, in place of J. R. Kenly, promoted.

Rock Island & Peoria.—Mr. H. B. Sudlow has been appointed Superintendent of this road.

Rumford Falls & Buckfield.—Mr. R. C. Bradford is now Treasurer of this company, as well as General Freight and Ticket Agent.

St. Louis, Kansas City & Colorado.—The directors of this new company are: W. O. Chevallot, Robert Hotchkiss, W. S. McWilliams, W. F. Stout, Francis Tieman, of Kansas; L. M. Potter, E. R. Stewart, of Ohio.

Slate Run.—Mr. J. B. Weed, of Binghamton, N. Y., is President of this new company.

Texas & St. Louis.—It is stated that Mr. W. P. Robinson, late of the New York, West Shore & Buffalo road, has been

offered the position of General Traffic Manager of this road. Mr. Robinson has served in the Southwest before, on the Missouri, Kansas & Texas.

Texas, Santa Fe & Northern.—At the annual meeting in Santa Fe, N. M., Dec. 23, the following directors were elected: J. C. Catron, L. M. Spiegelberg, Pedro Perez, W. W. Griffin, Justo Armijo, M. S. Otero, E. D. Franz, B. Ziglman, Antonio Ortez, Y. Salazar, A. Staab, John Symington, Vice-President; L. Spiegelberg, Treasurer; John Symington, Secretary.

Wabash, St. Louis & Pacific.—At the annual meeting of this company's controlled lines in Des Moines, Ia., Jan. 1, directors were chosen as below: *Des Moines & St. Louis*.—James F. How, W. H. Blodgett, A. A. Talmage, A. L. Hopkins, D. S. H. Smith, J. S. Polk, J. S. Runnels, F. M. Hubbard. *Des Moines & Northwestern*.—A. L. Hopkins, A. A. Talmage, J. F. How, J. S. Runnels, F. M. Hubbard, J. S. Polk and John S. Polk. *St. Louis, Des Moines & Northern*.—G. M. Dodge, C. F. Meek, F. M. Hubbard, J. S. Polk and J. T. Granger. *Des Moines Union*.—G. M. Dodge, C. F. Meek, J. S. Runnels, A. L. Hopkins, A. A. Talmage, F. M. Hubbard, J. S. Polk and J. F. How.

PERSONAL.

—Mr. Joseph Guy has resigned his position as Road-master of the Marquette, Houghton & Ontonagon.

—Mr. S. R. Johnston has resigned his position as Master of Road of the Main Stem of the Baltimore & Ohio road.

—Mr. Josiah G. Abbott retires from the presidency of the Boston & Lowell Co. after long service, on account of the pressure of his private business.

—Mr. Joseph Tucker, it is stated, has declined the position of Vice-President of the New York, Lake Erie & Western Co., which was recently offered him. Mr. Tucker's reasons are entirely personal.

—Mr. Lucius Tuttle has resigned his position as Assistant to the General Manager of the Boston & Maine road, to which he was appointed only two weeks ago. It is understood that Mr. Tuttle has received offers from both the Fitchburg and the Boston & Lowell roads, but he has not yet decided to accept either of them.

—Mr. Daniel N. Boynton, General Agent of the Wisconsin Central road, died in Chicago, Dec. 30, aged 37 years. Mr. Boynton entered the railroad service 20 years ago when a boy, and was employed by the Milwaukee & St. Paul, the Michigan Central and the Great Western roads and the Red Line before going to the Wisconsin Central. He has been employed by that road for eight years past.

—The Paterson, N. J., *Press* of Jan. 7 says: "Matthias Williamson, who died at his home at First and Grove streets, Jersey City, on Saturday, was appointed on March 2, 1841, a conductor on the Erie Railroad by its first President, E. Lord, and was in the service of the road through all its changes of name and management till his death. He was conductor of the first train, composed of a locomotive and one combination car, carrying passengers and freight between Piermont and Goshen, and collected the first fare and first freight charges received by the road. For the past 25 years he was a receiving clerk on the New York piers foot of Duane street."

—Mr. Reuben Wells, the new General Manager of the Louisville & Nashville road, was for some 25 years on the Jeffersonville, Madison & Indianapolis; most of that time as Master Mechanic. Some three years ago he was appointed Superintendent of Motive Power on the Louisville & Nashville, and has held that position until the present time. Mr. Wells was from the beginning a very active member of the Master Mechanics' Association, and has been Vice-President and President of that association, besides serving faithfully on its various committees. His favorite subject was boiler construction, and he has prepared and presented to the association several valuable papers on that topic. His many friends in the association and elsewhere will be glad to hear of his promotion.

—Mr. Chas. Graham, who has been Master Mechanic of the Bloomsburg Division of the Delaware, Lackawanna & Western road, with office at Kingston, Pa., during the past 20 years, has, in addition to his duties there, been acting in the same capacity on the Buffalo Division during the past two years, during which time the shops at East Buffalo have been built and equipped and the motive power and car departments fully organized. Mr. Graham entered the service of this company as a machinist in the shops at Scranton, Pa., Jan. 4, 1855, and is therefore completing a continuous service with this company of 30 years. Although the appointment of Mr. Griffith as Master Mechanic of the Buffalo Division will relieve Mr. Graham of his duties in that capacity on that division, yet he will continue to visit the division frequently.

TRAFFIC AND EARNINGS.

Coal.

The coal tonnage of the Pennsylvania Railroad for the week ending Dec. 27 was:

	Coal.	Coke.	Total.	1883.
Line of road . . .	109,180	38,377	147,557	133,189
From other lines . . .	40,850	1,108	48,018	42,936

Total 156,030 39,543 195,573 176,125

Year to Dec. 27 30,326,388 2,816,210 13,142,598 12,334,273

Increase for the week, 19,488 tons, or 11.1 per cent.; for the year, 808,325 tons, or 6.5 per cent.

The anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the year ending Dec. 31 was:

	1884.	1883.	Inc. or Dec.	P. c.
Coal port for shipment . . .	121,970	126,113	D. 4,143	3.3
S. Amboy	692,053	595,877	I. 86,246	14.5
Local points on N. J. divs. . .	842,868	821,971	I. 20,897	2.5
Co. use	187,284	163,739	I. 23,545	14.3

Total 1,834,175 1,707,030 I. 126,545 7.4

Of the total for 1884 there were 1,570,669 tons from the Lehigh region and 263,516 tons from the Wyoming region, against 1,389,507 and 318,123 tons respectively in 1883. The increase last year was entirely in Lehigh coal.

Cumberland coal shipments for the year ending Dec. 31 are reported as below by the Cumberland *Citizen*:

	1884.	1883.	Inc. or Dec.	P. c.
Balt. & Ohio R. R.	2,147,714	1,382,000	I. 764,705	55.3
Pennsylvania R. R.	350,296	418,966	D. 62,670	15.0
Ches. & Ohio Canal.	345,882	681,225	D. 335,343	49.3

Total 2,848,892 2,482,200 I. 366,692 14.8

This coal was brought from the mines as follows last year: Cumberland and Pennsylvania, 1,881,994; George's Creek & Cumberland, 509,321; West Virginia Central & Pittsburgh, 459,088 tons.

For the eleven months to Nov. 31 the Southwest Virginia Improvement Co. mined from its mines, on the New River

Division of the Norfolk & Western road, 255,223 tons of coal. The coal shipped was 165,649 tons; coal coked, 89,780 tons. Mining was suspended about two months.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Canadian Pac...	\$5,914,010	\$5,283,021	I. \$630,989	11.9
Central Iowa...	1,422,703	1,307,103	I. 115,600	8.8
Chi. & Alton...	8,707,490	8,810,610	D. 163,120	1.2
Chi. & East. Ill...	1,552,216	1,656,567	D. 104,351	6.2
Chi. Mil. & St. P...	23,473,000	23,639,781	D. 186,781	0.8
Chi. & Northwest...	23,365,578	25,024,021	D. 1,68,443	6.6
Chi. St. P., M. & Omaha...	5,768,528	5,515,388	I. 253,140	4.6
Cin. Ind. St. L & Chicago...	2,425,491	2,482,824	D. 57,323	2.3
Det. Lan. & No...	1,327,818	1,596,447	D. 268,629	16.9
Illinois Central...	13,086,253	14,027,167	D. 940,914	6.7
Long Island...	2,765,498	2,704,000	I. 61,498	2.3
Mexican Central...	3,964,438			
Mil. L. & W...	1,104,089	1,062,605	I. 41,484	3.9
Northern Pacific...	12,594,630	10,149,055	D. 2,445,565	24.1
Ohio Southern...	47,292	364,090	L. 108,112	29.7
Roch. & Pitts...	1,147,498	670,946	L. 476,552	71.0
St. L. & San F...	4,644,301	3,904,792	L. 739,509	18.9
St. P. M. & Man...	8,428,490	8,543,704	D. 115,314	1.3
<i>Eleven months ending Nov. 30:</i>				
Atch. T. & S. F...	\$15,056,800	\$14,596,701	I. \$460,099	3.2
Net earnings...	7,211,411	7,980,891	D. 769,480	9.6
Chi. Bur. & Q...	23,423,313	23,939,450	D. 516,120	2.2
Net earnings...	11,367,085	12,157,949	D. 700,864	6.5
Cleve., Col., Cin. & Ind...	3,475,831	4,004,762	D. 528,931	13.2
L. Rock & Ft. S...	512,558	490,314	L. 22,244	4.5
L. R. M. R. & T...	313,445	361,328	D. 47,881	13.3
Northern Pacific...	11,855,076	9,292,868	I. 2,562,210	27.6
Net earnings...	5,032,148	3,094,057	I. 1,938,091	62.6
Union Pacific...	23,459,081	25,393,747	D. 1,934,666	7.7
Net earnings...	10,601,831	12,787,253	D. 2,585,422	20.2
<i>Ten months ending Oct. 31:</i>				
Rome, Wat. & Og...	\$1,433,613	\$1,390,040	I. \$43,573	3.1
St. Johns. & L. Champlain...	240,308	235,597	I. 4,801	2.0
<i>Month of October:</i>				
Rome, W. & Og...	\$175,621	\$167,752	I. \$7,860	4.7
St. Johns. & L. Champlain...	25,752	27,668	D. 1,914	6.9
<i>Month of November:</i>				
Atch. T. & S. F...	\$1,461,921	\$1,536,274	D. \$74,353	4.8
Net earnings...	742,082	902,616	D. 159,034	17.7
Chi. Bur. & Q...	2,233,891	2,562,773	D. 328,882	12.8
Net earnings...	1,145,046	1,488,064	D. 343,018	23.1
Cleve., Col., Cin. & Ind...	319,708	370,079	D. 50,371	13.6
L. Rock & Ft. S...	80,557	70,052	I. 10,505	15.0
L. R. M. R. & T...	43,853	50,133	D. 6,780	13.5
N. Y. Ont. & W...	138,578	135,442	I. 3,136	2.3
North Pacific...	1,116,379	1,276,022	D. 159,643	12.5
Net earnings...	458,027	546,240	D. 84,213	8.8
Union Pacific...	2,426,770	2,65,880	D. 199,119	7.6
Net earnings...	1,284,315	1,156,815	I. 127,500	11.0
<i>Month of December:</i>				
Canadian Pacific...	\$309,000	\$324,000	I. \$185,006	57.0
Central Iowa...	116,249	118,237	D. 1,988	1.7
Chi. & Alton...	691,919	749,218	D. 57,299	7.6
Chi. & East. Ill...	132,888	140,039	D. 7,141	5.1
Chi. Mil. & St. P...	2,221,000	2,150,912	I. 70,088	3.3
Chi. & Nor'west...	1,376,700	1,760,500	I. 162,200	9.2
Chi. St. P., Min. & O...	443,030	443,000	D. 60	...
Cin. I. St. L. & Chi...	201,121	177,305	I. 23,726	13.4
Det. Lan. & No...	82,367	111,504	D. 29,137	26.0
Ill. Central...	1,226,300	1,188,456	I. 40,844	3.4
Long Island...	171,827	154,748	I. 17,079	11.0
Mexican Cent...	305,000			
Mil. L. S. & W...	89,005	79,470	I. 6,535	12.1
Northern Pacific...	739,544	856,189	D. 116,645	13.6
Ohio Southern...	47,315	35,207	I. 12,108	34.4
Roch. & Pitts...	95,570	89,085	I. 6,485	7.2
St. L. & San Fran...	375,500	491,200	D. 45,700	10.9
St. P. M. & Man...	826,283	699,480	I. 126,813	18.1

Weekly earnings are usually estimated in part, and are subject to correction by later statements.

Cotton.

Cotton movement for the four months of the crop year from Sept. 1 to Jan. 2 is reported by the *Commercial and Financial Chronicle* as follows, in bales:

	1884.	1883.	Inc. or Dec.	P. c.
Receipts	2,093,934	2,164,537	I. 70,603	3.3
Shipments	1,761,661	1,805,719	D. 44,058	2.4
Stock, Jan. 2	349,488	407,974	D. 58,486	14.3

Seaports:

	Receipts	Exports	Stock, Jan. 2
	3,691,516	3,556,962	I. 129,511

Stock, Jan. 2 1,015,767 1,269,070 D. 253,303 10.9

The interior movement has been a little lighter than last year, but the port receipts show a considerable gain. The export movement has been large this year.

The *Chronicle* says: "In the table below we give the receipts from plantations and add to them the net overland movement to Dec. 1, and also the takings by Southern spinners to the same date, so as to give substantially the amount of cotton now in sight.

1884-85. 1883-84. 1882-83. 1881-82.

	Receipts at the ports to Jan. 2	Interior stocks on Jan. 2 in excess of Sept. 1	Total in sight Jan. 2	Receipts at the ports to Jan. 2	Interior stocks on Jan. 2 in excess of Sept. 1	Total in sight Jan. 2
	3,691,516	3,556,962	4,238,478	3,691,516	3,556,962	4,238,478

Total receipts from plantations 4,023,789 3,915,780 4,053,621 3,793,776

Net overland to Dec. 1 227,855 261,252 244,112 220,910

Southern consumption to Dec. 1 78,000 87,000 90,000 70,000

Total in sight Jan. 2 4,329,644 4,264,032 4,387,733 4,084,686

Northern spinners' takings to Jan. 2 683,161 908,913 808,845 907,764

"It will be seen by the above that the increase in amount in sight to-night, as compared with last year, is 65,812 bales, the decrease from 1882-83 is 58,089 bales, and the increase over 1881-82 is 244,958 bales."

The Anthracite Coal Agreement.

The representatives of the anthracite coal companies have agreed as a basis of operations for 1885 upon the mining of 30,000,000 tons of coal, to be distributed as follows through the year:

January	1,500,000	July	2,800,000
February	1,500,000	August	3,250,000
March	1,800,000	September	3,250,000
April	2,400,000	October	3,250,000
May	2,400,000	November	3,250,000
June	2,500,000	December	2,100,000

This arrangement is subject to changes, and if there is a market for smaller amount of coal, as may become apparent later in the year, the monthly quotas may be reduced. Each company is to control its own production, regulating it by reducing time, closing some of its collieries, or otherwise, and each company may fix the prices of its production as it may see fit.

The production is to be divided among the companies according to the percentages given below as for 1885, which are then compared with the actual percentages for 11 months of 1884 and the full years 1883 and 1882:

	1885.	1884.	1883.	1882.
Philadelphia & Reading	38.85	36.60	38.50	38.50
Lehigh Valley	19.80	19.43	19.70	20.40
Delaware, Lackawanna & West.	16.05	16.80	16.60	15.90
Delaware & Hudson Canal Co.	11.00	10.90	11.10	11.10
Pennsylvania Railroad	5.00	4.50	4.80	5.00
Pennsylvania Coal Co.	1.50	1.40	1.20	1.10
New York, Lake Erie & Western	1.50	1.40	1.20	1.10
Total	100.00	100.00	100.00	100.00

The Pennsylvania Railroad Co., however, refuses to join in the agreement, and will not be bound by it, but will mine and transport coal as may best suit its interests, without reference to the other companies.

Illinois Commission Rates.

The Illinois Board of Railroad and Warehouse Commissioners has decided not to make a general revision of its schedules of freight rates at present. It has, however, made a slight amendment thereto, consisting principally of the addition of new articles of commerce.

Chicago Lumber Traffic.

The receipts, the sales and shipments, and the stock on hand at the close of the year, of lumber and shingles at Chicago for the last two years, are reported as follows by the Secretary of the Lumbermen's Exchange:

Lumber M. ft.	1884.	1883.	Inc. or Dec.	P. c.
Receipts	1,802,000	1,897,815	I. 95,815	5.0
Sales and shipments	1,833,000	1,936,592	D. 73,592	3.9
Stock Dec. 31	640,000	635,349	+ 4,651	0.7

Shingles M:

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Florida Railway & Navigation Co.—The southern division of this road is now completed to Panasoffkee, Fla., 8 miles southward from the late terminus at Wildwood and 84 miles from the junction with the central division at Waldo. Work on the grading of this line is in progress from Panasoffkee southward.

Georgia Marble Co.—This company has just completed a railroad 2½ miles long, extending from its quarries in Pickens County, Ga., to a connection with the Mariette & North Georgia road. It is used for carrying marble from the quarry, and the company intends to extend it this year some 4 miles further to a new quarry.

Houston & Texas Central.—This company did not pay the January coupons upon its first-mortgage bonds, but on presenting the coupons bondholders received the money, but were required to assign the coupons to the Southern Development Co., which advanced money to purchase them. A number of the bondholders have protested against this action, taking the ground that it amounts practically to a default and that the Southern Development Co. having purchased and holding coupons thereby acquires a first lien against the road, which may be used to the detriment of the bondholders. The company publishes no statement of its earnings, but it is believed that they have been sufficient to pay the interest.

Indiana, Alabama & Texas.—This company is now constructing that portion of its line between Clarksville, Tenn., where it intersects the Memphis Line of the Louisville & Nashville road and the Cumberland River 60 miles below Nashville, to Princeton, Ky., on the Chesapeake, Ohio & Southwestern, and this division of the road, it is expected, will be completed about the middle of next July—57 miles. There are 10 miles of track laid and about 13 miles additional graded, trestled, bridged and cross-tied complete for laying the same. The company is now receiving steel rails to lay these 13 miles and will by Feb. 1 have 23 miles of road in operation, reaching from Clarksville out into the great wheat and tobacco region of Southwestern Kentucky. There are now on the track about 75 cars, including a complete passenger train, and two locomotives, and an additional amount of rolling stock purchased for delivery as soon as required for our business.

Indiana & Illinois Southern.—This company has sent out notice to connecting lines that on Jan. 15 the running of all trains over the road will be suspended until further notice. The road is a narrow-gauge line extending from Switz City, Ind., to Effingham, Ill., 95 miles. For the past year the business has been insufficient to pay operating expenses and the owners of the road are not willing to make any further advances.

Indianapolis & Vincennes.—Work has been begun on a branch line extending from this road near Island City, Ind., to Dugger, a distance of 12 miles. At Dugger a superior quality of coal is mined, and the object of the branch is to reach this coal.

Kanawha & Coal River.—Work is in progress on an extension of this road from its present terminus 2 miles up the Longbottom Branch of Cabin Creek to a newly opened bed of splint coal. The road is now 18 miles long, from Coalburg, W. Va., on the Chesapeake & Ohio, southward to the coal mines on Cabin Creek.

Louisville, Evansville & St. Louis.—Application was made to the United States Circuit Court last week for the appointment of a receiver for this road. The suit was begun by Mr. Isaac T. Burr, of Boston, as holder of a judgment against the company. A number of counsel were present, representing various interests in the company, and quite a number of names were submitted to the Court for appointment as receiver. The person finally selected was Mr. Geo. F. Evans, who has been for some time past Assistant to the President of the company. The receivership is not unexpected, as the company has been in an embarrassed condition for some time past. The road extends from New Albany, Ind., to Mount Vernon, Ill., where it connects with the Louisville & Nashville. It has also a branch to Evansville, Ind., and several small branches. The floating debt is said to be about \$450,000. The capital stock is \$6,000,000, and there are outstanding \$3,900,000 first-mortgage bonds, \$1,000,000 seconds, \$3,000,000 incomes and \$571,000 car-trust certificates. The earnings of the road have been so far barely sufficient to cover the working expenses, and what little surplus has remained has been used in putting the road in good condition. Coupons on the first and second-mortgage bonds were funded for two years some time ago.

Louisville & Nashville.—The gross and net earnings of this company for five months of the fiscal year, in 1884 and 1883, were as follows:

	1884	1883	1884	1883
July	\$1,060,104	\$1,124,776	\$435,233	\$337,760
August	1,117,313	1,251,127	482,982	534,984
September	1,145,366	1,334,179	277,681	570,742
October	1,291,714	1,504,465	502,903	601,303
November	1,199,593	1,307,394	522,607	535,629

Total five mos. \$5,814,093 \$6,521,941 \$2,565,935 \$2,780,418

For the five months the decrease in gross earnings was \$707,648, or 10.8 per cent.; in net earnings, \$214,477, or 7.7 per cent.

Maine Central.—At a meeting of the directors in Portland, Me., Jan. 5, they voted to authorize the issue of \$800,000 in new 5 per cent. gold bonds to be used to fund the floating debt of the company. These bonds will have 20 years to run, but may be redeemed at the option of the company after 10 years, and an annual payment will be made to the Portland Trust Co. for a sinking fund.

Memphis & Little Rock.—A suit has been begun in the Chancery Court at Little Rock, Ark., by Henry B. Plant, of New York, to prevent the consolidation of this road with the St. Louis, Iron Mountain & Southern. The Court granted a temporary injunction pending further hearing in the case.

Morgan's Louisiana & Texas.—Arrangements are in progress for extending the organization of this road over the Louisiana Western, the Texas & New Orleans, the Houston & Texas Central, and the Galveston, Harrisburg & San Antonio roads, so that the entire line from New Orleans to El Paso will be under a single management. It is stated that the change, which will be a practical consolidation of the different lines, although the companies will retain their separate organizations, will take effect after about Feb. 1, when the appointment of the managing officers will be announced.

New York & Boston Inland.—The Boston Advertiser of Jan. 7 says: "Unless the sum of \$50,000 is expended within the next 10 days in constructing the New York & Boston Inland Railroad, the charter will lapse. The Boston aldermen recently referred the subject of permission to cross certain streets in this city to the next city government. The aldermen are not expected to meet again until the 12th inst. Monday the Railroad Commissioners were asked to decide

that the aldermen of 1882, by consenting to a location for the line, really authorized construction; but the Commissioners refused to so decide, and held, in accordance with a previous decision, that all construction is forbidden by law until a formal decision as to the mode of crossing—that is, whether over, under or at grade—is obtained. This probably defers, if it does not defeat, the scheme, but there is only a small portion of the public which has ever felt any confidence that the road would be built or that there was any real need of it."

New York, Lake Erie & Western.—This company did not pay the interest on its car-trust bonds due Jan. 1. The bonds on which the interest was then due were those of the Car Trust of New York, No. 2, series G. By the terms of the trust, holders of certificates can take no action until 30 days after default. A committee representing the Philadelphia holders are negotiating with the directors of the company. It is understood that they will not accept any agreement which does not provide for the payment of 6 per cent. interest on the face of the certificate. The proposal made was to fund series C, D, E, F and G into 35-year bonds, with a sinking fund provision beginning after five years. The bonds exchanged for the older car trust series are to bear 4 per cent. interest, some of the others 3½ per cent., with but 3 per cent. for the newer series.

New York & New England.—The earnings for the two months of the fiscal year beginning Oct. 1 have been:

	Gross.	Net.
October	\$300,992	\$365,878
November	254,421	310,092
Two months...	\$561,413	\$675,970

For the two months there was a decrease of \$114,557, or 17 per cent., in gross, but an increase of \$26,886, or 17.8 per cent., in net earnings.

New York, Susquehanna & Western.—In regard to the proposal of this company to pay one-half of the January and a few succeeding coupons in cash, and to fund the other half, President Fred. A. Potts said that the directors and their friends who hold \$1,500,000 of the bonds have consented to fund their coupons. They prefer to do this rather than borrow the money for the payment of car trusts, because the cars come under the lien of the mortgage as fast as they are paid for. It is better for the interest of the bondholders that the money should be raised and paid by them than that the directors should borrow the money.

Norfolk & Western.—This company has recently completed an extension or branch of its Ne. River Division, from Bluestone Junction, Va., to the Flat Top mines, a distance of 3½ miles. Two branches have also been built from this extension; the Mill Creek Branch, 1½ miles, and the Simmons' Creek Branch, 2 miles, both reaching coal mines near the line.

The company notifies the holders of first and second preferred South Side bonds, which matured Jan. 1, that they can have the payment of those bonds extended for 15 years at 6 per cent., provided they present their bonds to the company to be stamped in accordance with the terms of the agreement. Holders not desiring to extend their bonds may present them to Drexel & Co., in Philadelphia, that firm having agreed to purchase them.

Northern Pacific.—The gross and net earnings for five months of the fiscal year 1884-85 and 1883-4 (by months) are as below; in net earnings as shown rentals and taxes have been deducted:

	Gross earnings.	Net earnings.
July	\$1,022,438	\$850,223
August	1,032,602	1,043,624
September	1,236,560	1,194,714
October	1,461,511	1,397,222
November	1,116,397	1,276,022

Total 5 mos. \$5,869,490 \$5,761,805 \$2,624,010 \$2,325,837

The increase in gross earnings was \$107,685, or 1.9 per cent.; in net earnings, \$298,173, or 12.8 per cent., for the five months.

The last rail in the gap in the Wisconsin Division was laid Dec. 30, and the division will be open for traffic about the middle of the present month. This division extends from Superior, Wis., eastward to Ashland, 63½ miles. Of this 26½ miles were built last year, and the remaining 36 miles have just been completed. At Ashland the road connects with the Wisconsin Central, and also with the Milwaukee, Lake Shore & Western, which will soon be finished to that point.

Ogdensburg & Lake Champlain.—The Boston Advertiser says: "In a suit brought in the Supreme Court in Northern New York by Boston holders of the Ogdensburg & Lake Champlain income bonds, the company has been enjoined from paying interest on the Lamoille Valley Extension 6 per cents. under its guarantee. There are \$350,000 of these bonds, of which the New York Central Railroad Co. held \$175,000, according to its last report. The suit is undoubtedly favored by the directors. The Lamoille Valley Extension includes the second bridge across Lake Champlain, from the St. Johnsbury road's western terminus at Macquain to Rouse's Point. This extension parallels the Central Vermont. Now that the Central Vermont people control the Ogdensburg & Lake Champlain, their own bridge suffices, and if they can avoid the obligation imposed by their predecessors, on the ground that the guarantee was *ultra vires* and illegal, they will naturally be glad to thus help themselves and injure a rival."

Old Colony.—This company has sold \$250,000 in new 4 per cent. bonds having years to run, at 10½% and accrued interest. The issue was authorized by the stockholders some time ago, and is for the purpose of retiring old bonds which mature this year.

The Boston aldermen have passed an order approving of the plan of extending the Shawmut Branch of this road in the city limits. The plan contemplates an extension southward from near the intersection of the Shawmut with the old Dorchester & Milton Branch track, directly across the Neponset River. On the Quincy side of the river the extension will be connected with the existing track of the Granite Branch, which extends through East Milton to South Braintree. The special utility of the road will be its availability for running the trains of the main track of the Old Colony in case of any interruption of travel by the obstruction of the drawbridge near Neponset station. In such case, inward-bound trains may leave the main track at South Braintree, and reach it again at Harrison square. It gives the Old Colony road the advantage of two bridges over the Neponset. The plan will require the approval of the Harbor Commissioner and the authorities of Quincy.

Oregon Railway & Navigation Co.—This company has had unusual trouble with snow on its line this year. Generally the snow is not heavy nor deep in Western Oregon, the climate being moist rather than cold, but on Dec. 16 a very heavy storm set in and continued for several days. The passenger train which left Portland on that day stuck in a heavy drift at Bonneville, about 40 miles out, and at

latest accounts was still there, having been 22 days blocked. Some of the passengers chose to remain with the train, others were brought away by sleighs. The company has not the appliances for fighting the snow which are found on the roads further east, as they have not heretofore been required. Assistance has been secured from the Northern Pacific, which has its own road entirely clear, and it is expected that in a few days the road will be open. The trouble in this case was due not only to the heavy snow, but to high winds, which have continued almost without intermission since the storm began. It is probable, also, that the snow was mixed with drifting sand, which has always given the company a great deal of trouble on its line along the Columbia River, and which, mixed with dry snow, would make a drift which would pack down very hard and be very difficult to remove.

Pensacola & Atlantic.—General Superintendent W. D. Chipley issued the following circular to the employees of this road, dated Pensacola, Dec. 27:

"In reply to numerous inquiries from employés, I will say that on Jan. 1 the Louisville & Nashville Railroad Co. will extend its organization over the Pensacola & Atlantic. This action, in the interest of economy, will not be apt to affect any employé outside of the general office at Pensacola. It is only necessary to perform your duties to maintain your positions.

"In this connection I will say to the employés that I will continue my connection with the company as Vice-President. The new organization will relieve me of the operating department of the road, in order that I may devote the necessary attention to the company's lands and other important matters. This will sever my direct connection with employés who have labored with me under many difficulties; to whom I am indebted for a record of which I am proud: Operating schedules as fast as any in the South; no passenger has ever been injured, and no accident has occurred to suggest that 40 miles per hour and upward was unsafe on P. & A. rails.

"In your ranks are men who assisted in the first survey, who helped drive the first spike, and who opened the first throttle in response to signals from men yet in charge of the bell-cord. You have all seen a wilderness transformed into pleasant villages, and your industry has helped to secure an increase in earnings for nine months of the current fiscal year of over 60 per cent. over earnings for the same months last year.

"I sever the bond for the new and more agreeable duties, but I regret that feature of the change which separates us, and I will always remember with regard the faithful employés of the Pensacola & Atlantic Railroad Co."

Philadelphia & Reading.—The Sub-committee has held meetings from day to day during the past week, and on Jan. 5 a meeting of the General Committee of bondholders was held in Philadelphia.

The Sub-committee presented a report, stating that 8 plans had been presented and they had decided after discussion to refer all of these to the General Committee. The members of the General Committee, after examining these plans, referred them to a new sub-committee of three, Messrs. Antelo, Wanamaker and Wright, with instructions to analyze them and prepare a single plan to be submitted to the General Committee at its next meeting.

The interest on the general mortgage bonds was not paid Jan. 1. The default was generally expected.

A bill for the foreclosure of the general mortgage was filed in the United States Circuit Court Jan. 3 by counsel for Wm. M. Robinson, of New York, a bondholder. It was stated in court that the Fidelity Trust Co., the trustee, was prepared to take action if proper requisition were made on it by the bondholders.

Orders have been issued that 21 collieries of the Philadelphia & Reading Coal & Iron Co. shall not resume work on Jan. 1. How long these collieries, which are among the least profitable of the 70 owned by the company, will remain idle will depend on circumstances.

The bondholders' committee has issued a circular recommending the following ticket to be voted for at the annual meeting next week, the board of managers also joining in the recommendation: President, George de B. Keim; Secretary, Albert Foster; Treasurer, Wm. A. Church; Managers, J. B. Lippincott, I. V. Williamson, Franklin A. Conly, Joseph Wharton, Robert H. Sayre, John Wanamaker. The three new managers proposed are Messrs. Wharton, Sayre and Wanamaker; the others are now in office.

Rome, Watertown & Ogdensburg.—The following were gross and net earnings for October, the first month of the fiscal year:

	1884.	1883.	Increase.	P.c.
Gross earnings	\$175,621	\$167,752	\$7,869	4.7
Operating expenses	77,342	92,489	4,852	5.2
Net earnings	\$78,279	\$75,262	\$3,016	4.0
Add rents	642	561	80	14.2
Total	\$78,921	\$75,824	\$3,096	4.1

The proportion of taxes for the month was \$7,818, leaving \$71,103 for the payment of interest and other charges.

St. Louis, Kansas City & Colorado.—This company has filed articles of incorporation to build a railroad from St. Louis to Kansas City, and thence to the Colorado line in the extreme southwestern corner of Kansas, a distance of about 850 miles. The company has made arrangements to buy the Forest Park & Central road, a short suburban line, which will be used as an entrance into St. Louis. The board of directors does not present any strong or prominent names.

Slate Run.—This company has filed articles of incorporation in Pennsylvania. The road will be 15 miles in length, starting at a point on the Pine Creek Railroad near the mouth of Slate Run, in Lycoming County, Pa., to a point on Youngwoman's Creek, two miles from the dividing line of Clinton and Potter counties. The road is to be built for the purpose of bringing out hemlock bark and lumber.

Union Pacific.—Additions and extensions of the branch lines of this company have recently been made as follows: The Junction City and Fort Kearney Branch of the Kansas Division has been extended from Lawrenceburg, Kan., west to Belleville, a distance of 18 miles. The new terminus is 79 miles from the main line at Junction City. The Fullerton Branch has been extended from Fullerton, Neb., west to Cedar Rapids, a distance of 17 miles. The new terminus is 50 miles from Columbus and 100 miles from Norfolk. The Baldwin Branch of the Denver and South Park Division has been extended from Baldwin, Col., to Mines station, a distance of three miles. This branch is of 8 ft. gauge.

The company's statement for November and the eleven months ending Nov. 30 is as follows:

	November.	1884.	1883.
Earnings	\$2,426,770	\$2,625,889	\$23,459,081
Expenses	1,142,455	1,409,074	12,857,251

Net earnings, \$1,284,315 \$1,156,815 \$10,601,830 \$12,787,453

For the eleven months the decrease in gross earnings was \$2,984,866, or 11.1 per cent.; in net earnings, \$9,185,623, or 17.1 per cent.